

AVIATION WEEK

A MCGRAW HILL PUBLICATION

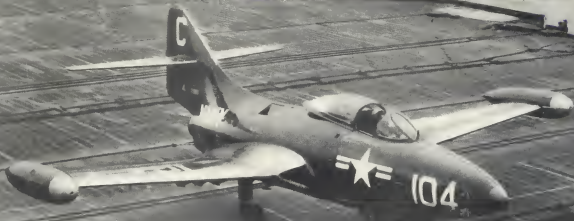
JUNE 16, 1952

50 CENTS



Landing Number 39,000!

It was no coincidence that the 39,000th plane to come to a stop in the U. S. S. Midway's arresting gear was a F9F PANTHER. These battle-proved turbo-jets, Korean veterans since the start, have been taking off and landing on this big carrier's deck for over two years. That the once spectacular is now the commonplace reflects Navy and Marine Corps skill and teamwork . . . plus the ruggedness and dependability of the GRUMMAN PANTHER.

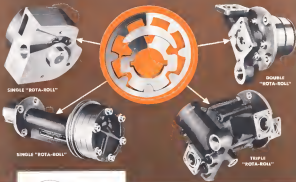


GRUMMAN AIRCRAFT ENGINEERING CORPORATION, BETHPAG

Contractors to the Armed Forces

PUMPING PROBLEMS AT HIGH ALTITUDES?

Sundstrand's "ROTA-ROLL" is the answer



6 "ROTA-ROLL" advantages for aircraft engineers

- 1 Superior altitude performance—outstanding inlet characteristics assure smooth operation at extremely high altitudes
- 2 Self-compensates engine altitude speed and weight
- 3 High efficiency—at high or low altitudes
- 4 Dependable—large rotor drives at 15% lower speed than drive shaft—less wear, longer life
- 5 Easily isolates flow—no oil, empty roller and roller alternate lubrication, so other roller runs with flow of full being pumped. Great operation
- 6 Custom-designed—with capacities and number of pumping elements to meet your exact needs

1, 2 or 3 pumping elements

You can get high efficiency and uniform flow at extremely high altitudes with a Sundstrand "Rota-Roll" pumping unit! One unit can have up to three pumping elements for lubrication, transfer, scavenging, or other special applications! The compactness of the "Rota-Roll" compact design, plus its favorable high speed characteristics, make it possible to accommodate a single, double, or triple pumping unit within extremely limited space. Units shown here are now being used as tested by engine manufacturers. A custom-designed unit with capacity required for your needs can be developed through Sundstrand's reliable research, expert engineering, and precise production. May we work with you?



SUNDSTRAND AIRCRAFT HYDRAULICS

SUNDSTRAND MACHINE TOOL CO.
HYDRAULIC DIVISION, ROCHSTER, N.Y.

B.F. Goodrich



How B. F. Goodrich helps B-47 fly, land, take on fuel

fuel that saves muscle and time (1) One problem facing engineers faced when they designed the B-47 was the dry spots between elements and troughs, roller seal problems, and debris and wing. Flaps were needed to make manual control easier. But more so, they were needed to make sure the B-47 was the master. That's why the B-47's fuel system was designed to be 100% effective and, based on absolutely no moving parts, achieved simply with the flap.

Keyhole holes in the wing (2) Starting point of the B-47 was an ever-present problem for Boeing engineers. When it came to the fueling

gear, they cut weight by using a bicycle-type gear with BFG wheel and tire assembly. BFG's Expendable Tube makes weight less per man of energy than any other tube. Which was light, expensive, compact. They take 175 psi pressure, yet are light as weight.

Rubber keeps in out of flying fuel: even comes in (3) BFG's rubber started to be the key to prevent air flowing in the B-47's fueling, easy cycle opening, which returns the flying B-47 for refueling. Refueling that how could it be made in 10 minutes? BFG engineered the job in 10 minutes. BFG engineered the job in 10 minutes. BFG engineered the job in 10 minutes.

necessary for effective use of fuel.

These are typical of the developments that have come from B. F. Goodrich, leader in rubber research and engineering. BFG products for aviation include tires, wheels and baskets, wheel rubbers, de-icers, antennas, inflatable seals. From the Boeing 747 to the B-47, BFG's products are everywhere. BFG's products are everywhere. BFG's products are everywhere.

B.F. Goodrich
FIRST IN RUBBER



Forgings for the aircraft industry today demand the utmost in engineering and production techniques and in scientific laboratory control. This massive complicated landing gear component, weighing over 400 pounds, is typical of Wyman-Gordon's forging contribution to the ever-growing progress in aircraft design. In crankshafts for the automotive industry and in all types of aircraft forgings, steel and light alloy, Wyman-Gordon has pioneered in the development of forging "know-how"—there is no substitute for Wyman-Gordon experience.

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WORCESTER, MASSACHUSETTS
HARVEY, ILLINOIS DETROIT, MICHIGAN

NEWS DIGEST

Domestic

Trans World Airlines has paid the Glenn L. Martin Co. \$425,000 cash for the 12 T-20A transports which it has been leasing. The firm was \$600,000 more than the estimated proceeds for these planes at the time the Martin financing program was announced with the new Aviation Week Jan. 24, p. 13. The T-20A was to be returned to Martin under a lease agreement made in the summer of 1950 by TWA, as the airline took delivery in its later version 4-04 Martin transports. TWA and lower passenger traffic made it advisable to continue its option to buy the T-20As in addition to the 4-04s on order. It has received 19 out of the 40 4-04s. Despite these sales, the \$425,000 price per T-20 is only \$60,000 less than the original 4-04 price.

Nothing F-96C. Scorpion II's other fighter is coming off the company's Hawthorne, Calif., line with Allison J15-A-51 turbojets, giving the plane thrust itself and higher rate of climb.

Lt. Gen. Wang-Kuo-Ming, Chinese National Air Force Chief of Staff, has arrived in the U.S. with his staff for a 15-day tour of USAF facilities. He will confer with USAF Army Chief of Staff Twining in Washington.

Boeing Aircraft Co., Wichita, plans to build a \$11 million, 311,600 sq. ft. building south of its main plant for T-36 two-engine bomber production. Completion is expected in 1953. It will house Boeing's operations space to more than 1 million sq. ft.

Arthur Kinn, CAA's flight surgeon and medical examiner, died May 30 in Long Island, at the age of 67. He was one of the country's first flight surgeons.

Second edition of "Design Manual on Aircraft Structural Fastenings" has just been published by Aircraft Industries Assn. Assn. of transport type much of the material in the book is applicable to other civilian craft and military planes.

Albert A. McGill, 77, aeronautics instructor at California Institute of Technology, died June 1 in Pasadena, Calif. He joined the institute's predecessor, Thayer College of Technology in 1918 as assistant to accounting and archives.

Bids for construction of 35 million hangers to house the eight B-42 Stratofortress bombers are being



DR. GUNST PERSONALITIES gathered at London Airport to watch the taking of their plane for inspection on the world's first scheduled jet airline service, May 3. From left to right: Sir Geoffrey de Havilland, technical director, R. E. Fildes, director

and chief designer, Maj. F. E. Thibault, chairman and technical director of DH Engineering Co., John Cunningham, chief pilot, F. T. Blore, DH chairman, and W. D. Baxter, engineering director of BOAC.

asked by Boeing Airplane Co., Seattle. The longer is to be 755 ft. wide and 230 ft. deep. Bids will be opened June 19 in Seattle.

Ninth-million dollar contract for North American F-86D all-weather fighter plane production has been granted Union Switch & Signal division of Washington Air Base Co. Melroe Inc. recently acquired by Westinghouse. Air Base will be engineering and development work on the simulator. (See p. 61 for story on F-86D simulator.)

Special aviation session of the 1952 annual meeting of the National Transportation Assn., meeting at the Hotel Statler, N. Y., June 10, was attended by more than 250 persons who heard discussions on fighting aviation losses.

Financial

Wm. McClelland Co. San Diego reports net rounded profit of \$147,675 for the first half of fiscal 1952 on gross income of \$1,747,077.

Capital Airlines notes a net operating profit of \$14,651 during April with operating expenses at \$303,800.

International

London newspaper report that aircraft

manufactured at Harwell have developed lightweight alloy should be attractive when it is decorated by official British sources according to cable to Aviation Week, but with a development in the near future is not believed likely by Western Supply people.

West Germany has banned aviation aircraft previously forbidden under the Copenhagen treaties of 1920 and old German Aviation Research Institute at Peace-Marketing Airport (Aviation Week, June 2, p. 13). But production of military weapons, including planes, is still forbidden by the same treaties, between the West and East.

Grid airport facilities in Canada are to be expanded with government spending \$7,000,000 during current fiscal year. Expenses are to be levied on all airlines in the country, including the Canadian National, the Western Union, the Western Air Lines and Winnipeg.

Thailand is getting further technical aviation assistance from KAAD with program emphasizing maintenance approaches and aircraft maintenance training. An aircraft shop is to be set up.



ASSAULT and battery



An amazing phrase taken as new meaning when Chase ASSAULT Transport delivers field Artillery BATTERY men and equipment to forward combat areas by landing. A dream in World War 2, this technique is a reality today as a result of combined research effort by the Air Force-Army-Chase Aircraft team.

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CHASE AIRCRAFT CO., Inc.
WEST TRENTON, NEW JERSEY



AVIATION CALENDAR

- June 26-27—Aviation Distribution and Maintenance Assn., 1st year meeting. The Grand Hotel, Michigan St., Chicago
- June 27—Comm Aircraft Co.'s nationwide distributor-dealer meeting, Wichita
- June 27-28—Aviation Trade Shows installation exhibit of aircraft parts and equipment, Hotel Fairgrounds, New York
- June 29-31—American Society of Mechanical Engineers symposium on shock and vibration transmission, Pennsylvania State College, Pa.
- June 30-31—American Society for Testing Materials 11th symposium meeting, Salt Lake and New Yorker Hotels, New York
- June 30-31—Aviation and space industry conference sponsored by Scientific Magazine Group, London Aviation Corp., Sydney, N. Y.
- July 1-5—American Meteorological Society national meeting, including joint session with the Institute of the Aeronautical Sciences, Hotel Statler, Buffalo, N. Y.
- July 3-5—Northwestern States Society Meeting, Kansas, N. Y.
- July 4-6—Nash News 4th women's business round-up met from Hotel Am. Coll., in Toronto, N. Y.
- July 14-15—Aviation Writers Assn. annual convention, Ambassador Hotel, Los Angeles
- July 16—Regional air safety forum open house by Corporation Aircraft Division (St. Louis div.) and CAA, open to the public, "Weather Flying", Kees Airport, St. Louis
- July 16-18—Activities of the Aeronautical Sciences annual summer meeting, LOS Western Headquarters Building, Los Angeles
- July 18-20—Women Flyers of America national convention, Chattanooga, Tenn.
- July 21-22—Silver anniversary celebration, Pacific College of Aeronautical Technology, Palo Alto Airport, East St. Louis, Ill.
- July 20-21—University Aviation Assn. 40th annual meeting, Fair State Teachers College, Miami, Fla.
- Aug. 27-28—National Flying Women convention, Alabama Polytechnic Institute, Auburn, Ala.
- Sept. 1-2—Society of British Aircraft Constructors annual display, Farnborough, England
- Sept. 17-19—International Air Transport Assn., eighth annual general meeting, Geneva, Switzerland
- Sept. 29-Oct. 1—National Electronics Convention, Sheraton Hotel, Chicago

PICTURE CAPTIONS

1—An C-119; 2—C-119; 3—C-119; 4—C-119; 5—C-119; 6—C-119; 7—C-119; 8—C-119; 9—C-119; 10—C-119; 11—C-119; 12—C-119; 13—C-119; 14—C-119; 15—C-119; 16—C-119; 17—C-119; 18—C-119; 19—C-119; 20—C-119; 21—C-119; 22—C-119; 23—C-119; 24—C-119; 25—C-119; 26—C-119; 27—C-119; 28—C-119; 29—C-119; 30—C-119; 31—C-119; 32—C-119; 33—C-119; 34—C-119; 35—C-119; 36—C-119; 37—C-119; 38—C-119; 39—C-119; 40—C-119; 41—C-119; 42—C-119; 43—C-119; 44—C-119; 45—C-119; 46—C-119; 47—C-119; 48—C-119; 49—C-119; 50—C-119; 51—C-119; 52—C-119; 53—C-119; 54—C-119; 55—C-119; 56—C-119; 57—C-119; 58—C-119; 59—C-119; 60—C-119; 61—C-119; 62—C-119; 63—C-119; 64—C-119; 65—C-119; 66—C-119; 67—C-119; 68—C-119; 69—C-119; 70—C-119; 71—C-119; 72—C-119; 73—C-119; 74—C-119; 75—C-119; 76—C-119; 77—C-119; 78—C-119; 79—C-119; 80—C-119; 81—C-119; 82—C-119; 83—C-119; 84—C-119; 85—C-119; 86—C-119; 87—C-119; 88—C-119; 89—C-119; 90—C-119; 91—C-119; 92—C-119; 93—C-119; 94—C-119; 95—C-119; 96—C-119; 97—C-119; 98—C-119; 99—C-119; 100—C-119.

Washington Roundup

Clearing the Clouds

Clear facts are being clouded with politics on the issue of who has been asked for air power—Truman? Taft? Eisenhower?

The answer adds up to this: All three of these top political spokesmen have blown hot and cold on air power at the international situation blow hot and cold over the past few years.

The real story among the three men, though, is what type of air power? On this score:

- President Truman and Gov. Dwight Eisenhower place strong emphasis on tactical air. This is U.S. air force ability to have overseas bases for strategic air. And, to have other overseas commands in "hot" land areas spread, aviation—both tactical and long range—supported by dependent tactical air power.
- Presidential candidate Robert Taft and his advisers, on the other hand, mean U.S. based intercontinental bombers when they speak of air power. Taft has told of a massive force of B-36s as the foundation for U.S. military preparedness—though the Air Force staff consider the plane obsolete and new looks to faster, smaller, more jet-powered to be the backbone of its strategic air arm.
- But in the Eisenhower-Truman-Taft record on air power:
- After the close of World War II, Eisenhower, then as Chief of Staff, accepted as air power's most influential advocate a fact acknowledged by Gen. Carl Spaatz, then chief of the Air Corps, as well as by the publicly department of the Taft leadership. The 70-group Air Force program had its origin with Spaatz squarely backed by Eisenhower.
- When limits of war clouds hung over the globe in early 1948, President Truman fully backed up the recommendations of his Air Policy Commission headed by the present Secretary for Air Thomas Tinker and asked Congress for assault procurement funds to launch a 70-group program as its first year and billion "No. 1" program.
- The Congressional Aviation Policy Board headed by Sen. Owen Brewster, did not back a 70-group USAF program, however. It endorsed the service for working unilaterally, presented the reports program that USAF and Naval Aviation felt adequate for current, and ordered them to get together on a unified program and submit it to Congress. Taft, at the time chairman of the Senate Republican Policy Committee, was in full support for the board's backing of a 70-group USAF—although a result of the board's May 1, 1948 report shows backing was not given.
- Without control, the President's request for funds for the 70-group USAF buildup was granted in the spring of 1948 and the program took off.
- But the limits of air stayed in tale and then came the tough battle over whether to continue with the 70-group program.
- President Truman thought so. His budget submitted to Congress in January, 1949, provided for only a 40-group program.
- But Congress thought not. The House voted overwhelmingly to add funds for the 70-group, the Senate on Aug. 26, 1949, voted 85 to 9 against it.
- And Taft voted on the side of aviation instead of air power.

Later, the House program provided, but the President responded the same, apparently—which he hadn't asked for.

- Meanwhile, Eisenhower, who left in Chief of Staff in November, 1950, was not the picture.
- He came back as an exponent of air power—but a stronger exponent of aviation. Eisenhower backed a tentative military budget of \$14.5 billion down up to a Defense Security Loan program. But when Johnson, in Truman's request, cut this to \$13 billion, Eisenhower, as a public speaker, challenged the Administration for letting air power slip below a bare minimum.
- What it all adds up to is this:
- Taft on the one hand on power side as the Senate voted against it.
- Eisenhower on the other hand as a demand of air power to 70-group program. He made it clear to Senate Appropriations Committee he thought aviation more important.

Political Notes

Sen. Owen Brewster, today's June 16-Republican press in Maine will denounce the political front of the Capital Hill's most active party in aviation. He's been known to the industry for his chairman ship of the Congressional Aviation Policy Board and sponsorship of an "All American Play Law" to support for U.S. international air operations. Brewster's back again in Maine's Gov. Jackson Pease.

Leslie Beckwith, the high-ranking member of House Interstate and Foreign Commerce Committee, who has also supported aviation—but never done much about it—has been almost down in Texas for the Democratic Senate nomination showdown date July 25.

Sen. Edwin Johnson, chairman of the Senate Interstate and Foreign Commerce Committee, is carrying campaign for presidential against Sen. Richard Russell of Georgia. Now chairman of the Senate Armed Services Committee, Russell has tried the Air Force in on air power he wouldn't talk to the Senate move to add funds to the President's budget to continue a 70-group USAF program back in 1949.

Sen. Frank Church, the secretary for Air but with traffic committee press support for the Democratic Senate nomination in Missouri, but President Truman is backing the state's attorney, General Frank Taylor. Missouri Democratic primary is Aug. 17.

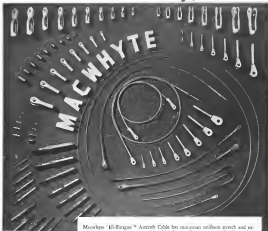
Sen. Harry Glass, the only present member of the Senate who has considerable knowledge in being challenged for reelection by Rep. Homer Johnson of Washington.

Back in early 1948, when virtually everyone in Washington was behind a 70-group USAF, Glass wasn't. He was one of the two members of the Senate who voted against funds for it. The other? Edwin Glass Taylor of Idaho who thought air power might irritate Russia.

Rep. Albert Gore. The young congressman from Tennessee, interior of the investigation of Air, Inc. and the connection of a USAF publicly shed light on how it really worked in the House voting a bill on further USAF payments to the Air, it gives clear light to what the Senate Democratic nomination has said. Sen. Kenneth McKellar, Tennessee Democratic primary is Aug. 7.

—Katherine Johnson

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WHO'S WHERE

In the Front Office

Robert H. Hume has been made vice president of General Dynamics Corp. (formerly Electric Boat Co.) and also assistant to the chairman of the board of its subsidiary, Canadian Ltd. His office will be in New York.

Al Macomber has been elected vice president-commercial operations for Avco Aerochemicals (Avco Aerochemicals). For nearly 10 years, Macomber served Avco in 1967 as assistant to the president. He has now put his full hands on Avco and Avco Aerochemicals. He will work with and assist the board and management against other interests and handle contractual agreements with other airlines.

Stephen R. Higgins has been named executive vice president of General Dynamics Corp., Philadelphia, industrial unit. He formerly was executive vice president for Bell Aircraft Corp. (Bell Co.).

Changes

E. F. Eustace, general manager of B. F. Goodrich Co. Industrial and commercial products division since 1949, is slated to become general manager of the firm's Automotive, Aviation and Government Sales division later this year.

Bob Thresher has been named public relations manager of Conquest Aircraft Co. Thresher, formerly of Bell Aircraft Corp., also has been appointed sales promotion manager. The company has expanded the public relations and sales promotion departments.

Alexander Eustace has been designated technical engineering supervisor for the house, Instrument Laboratory, Inc., New York City.

Walter J. Blicher has been made assistant vice president for American Airlines, New York City, according to J. J. Hume, who has moved into the senior general office.

What They're Doing

Max Alexander P. de Smedt has been named chairman of the National Aircraft Constructors for 1952.

Honors and Elections

Douglas Campbell, former vice president general manager, was elected chairman of Traffic Conference No. 1 of the International Air Traffic Association at Buenos Aires. Mr. Howard Eustace, Republic Aviation Corp. director of field service, has been awarded New York University's Adams International Service Award for 1952. He was designated speaker in the ceremony.

Dr. Carl B. Milliken of Columbia University has been elected to the National Academy of Sciences. He is a member of the National Academy of Sciences and the National Academy of Engineering. He is also a member of the National Academy of Sciences and the National Academy of Engineering.

INDUSTRY OBSERVER

► Douglas RB-66 (USAF) stream of Navy's ASD may get an amendment to them similar to the two-gun aircraft carrier which General Electric is producing for the Boeing B-47.

► Army has ordered a service test quantity of three two-engine Aero Commander personnel transports which will be designated L-26, first flightable models of Aero Commander's military sales program which has been going on at least three years. They will be closely comparable in size and mission with the Beech Twin Bonanza L-23 Army planes.

► Piper's PA-23 two-engine four-place Twin Otter began production in the last quarter of this year, with the first production plane due in the line only next year. Meanwhile, work already has started on two more production models. These include the first airplane built since 1948 at last flight. Target price will be less than \$15,000.

► One of the reasons Texaco Aircraft Corp. is going to make the McDonnell F-101 fighter instead of General Electric's availability of aircraft testing facilities. If General Electric Aircraft Corp. had built the engine, it would have involved an aircraft test setup at McDonnell-Crafton Airport, near the home of the McDonnell Aircraft Corp. It is not considered by enough for flight test of the engine. There is plenty of space at the Texaco test field.

► Interesting point on the recent revolution in the Fairchild Republic of the altitude reached last year by the Douglas D-558 II Skystreak was the fact that the NACA grand international transonic experiments showed it to be over 70,000 ft., while Navy Bureau of Aeronautics reported it to be more than 77,000 ft. based on an altitude measurement recording. These figures put the altitude from 5,000 to 7,000 ft. higher than the previous record set in 1951 by Air Corps Capt. A. W. Stevens and Capt. A. Anderson in the National Geographic Society's Explorer II balloon which soared to 72,994 ft. The altitude reached by Douglas plane Bell X-2 was in an official record, however, since the plane was launched from a B-29 mother plane at about 38,000 ft.

► The Pioneer H-2A Woodhouse helicopter has been ordered by the Royal Canadian Air Force for use as a rescue transport in Canada. The 12 rotor engine is designed for operation at 1,000 ft. The Canadian aircraft will be delivered to USAF for transfer to RCAP.

► Douglas Aircraft calculates that if the 17 freighter DC-6As now on order had been designed solely for freight they would cost approximately \$1,000,000 each, as compared with the actual price of \$1,100,000. This figure is based on the cost of development with some 200 DC-6 passenger planes. In terms of development cost a seven-year period, the freighter planes cost a direct operating cost of \$1.2 cents per pound as compared to actual 5.8 cents per pound.

► Aircraft Industries Inc. has pulled its engineers and research on aircraft development on USAF's proposal to distribute standard aircraft characteristics charts to the aviation industry, provided the charts are not made available before delivery of the first production aircraft of the type and model and are confined to production planes. Charts will not be made for prototypes.

► Delay in production of powerplants for the McDonnell Aircraft Corp.'s L-1011 Hercules and other helicopters have caused the manufacturer to set back its production schedule to 12 machines in the third quarter of 1952. The 12 powerplants will go into accelerated service testing, development of flying and opening equipment and special techniques, as well as in the use of the manufacturer.

► USAF has formally notified its public information officers that it is officially admitting the existence of the North American XF-100, McDonnell XF-101 Voodoo and the General XF-102 jet fighters and the Douglas RB-66 jet bomber.



FIRST BATTLE-DAMAGED plane undergoes repairs and rehabilitation at FEAMCOM's major depot war the South Korean F-51

Big AF Depot Key to Korean Air Strength

- For East Air Materiel Command handles more than 9,500 parts daily to keep FEAF planes flying.
- And in addition the depot is in charge of retrieving battle-damaged planes; often under enemy's nose.

By George L. Christian

Tokushima Air Base, Japan—The reserve that leads the East Air Forces fighters and bombers in their daily action against MIGs and Communist ground forces in the growing here, the Far East Air Materiel Command. From its warehouses come every kind of ammunition, rocket, bomb as well as repair planes against the foe. In its shops are assembled new aircraft arriving for combat. Here, practically all damage suffered in combat is repaired.

Logistical nerve center of the FEAF, the depot occupies the former Japanese Tachikawa Aircraft Corp. about 25 miles north of Tokyo. Its commander, Brig. Gen. John P. Doyle, calls it "the only Air Force General Depot in the world." (Gen. Doyle's location is just far southwest to Hanoi—USAF. Wash. office, D. C.)

• **West Doctrine**—FEAMCOM's domain is vast, its duties many. The command encompasses more than ten sub-bases and supporting units in the Japanese

Islands, the Philippines, Okinawa, Guam, Taiwan and Korea. Its duties include repairing battle-damaged aircraft, overhauling all basic engines, cranks bearing parts not immediately available by other means, supplying FEAF with the thousands of thousands of parts required to operate on the line. "The depot, along with all this, even stores many dogs."

An unusual aspect of FEAMCOM is that it not only spends the taxpayer's money, but saves it, too. Doyle estimates that he commands a rolling \$500-\$550,000 profit monthly. This is the value of parts and equipment reconditioned by the base and returned to stock as available.

Another way FEAMCOM economizes is by buying locally manufactured merchandise. Example of the savings is reduced a U-8 non-motorized engine, each costing \$246 can be bought in Japan for \$155-149. Aside from the financial economy, the saving in shipping space is considerable. Doyle estimates that several million

dollars worth of locally made material will be purchased this year.

• **Dock & Duty Fleet**—There is no pleasure flying or flying just to get your bones in line; a USAF colonel told Aviation Week. Some 121 "hot" home-based aircraft, plus administrative units are included in FEAMCOM's assets. When not substantiating duties such as, among thousands of parts due to FEAF or shipping together a new aircraft for repairing battle-damaged aircraft, the base has parts up to the front lines in Korea. And while they are there, all parts from supply check with the local supply effort to see what his problems are.

Such a system has many advantages. The members of 100% tank work, in business, pilot's goodness, a maintenance at a high level, and the men are kept constantly aware of the requirements of the front lines to be frequent touch and personal conversation with the man on the spot. To make certain there is no bad report in his organization, Gen. Doyle appoints a courier from his Korea base flying at least one repatriate every 48 hours. FEAMCOM plane scheme copies. Normally, repairable items flow into the repair base at Tachikawa at the rate of 15,000 per day.

• **Plane Retrieval**—Based near Seoul is a field maintenance squadron where

specialty is retrieving aircraft which have crashed at sea.

The job is often far from easy. Here is an example, quoted by Staff Lt. Richard Johnson, officer in charge of a "recovery." Going to retrieve a plane "a truck got a flat tire just after starting out. A worker's tractor stuck and its cable broke. When the team pushed the damaged aircraft, they found it stuck solid as rock and the worker, in trying to pull it out, sank up to its axles."

The worker was headed out, but by then a 40-ton truck had also become stuck. It, too, was finally freed.

"The next day, the aircraft was disassembled and placed on the truck for the trip home. On the way the crew met a flying squadron and a maintenance squadron. The cargo load was almost lost over a cliff when the only of the heavy truck had to be hoisted around a sharp mountain curve. But we made it."

To get back the 225 aircraft, several have been returned to date, the team has had to go behind enemy lines, crawl through rice paddies, struggle up steep mountains and sail longer than the winter in equipment has been tremendous.

• **Operation Relapse**—A new unit designed to recover abandoned wreckage as supplies material in Korea has been added to FEAMCOM's 48th Air Depot Wing (Material) in Korea.

The unit will always any material that tactical units find impossible to return to depots for redistribution to other units.

In the course of its job, the material recovery unit, now based at work in the combat area, serves all seven air commands. Some material is returned to active combat commands in Korea, other supplies are sent to depots for redistribution, salvage or reuse. Should parts come to Korea, the recovery unit may present the waste of the last conflict, when vast quantities of useful equipment were left behind to rot and rot.

• **What They Need**—This is what a warplane should be made of, according to a wing commander of an air depot where primary task is to get war material back into the air.

A combat craft should be as simple as possible, an unnecessary gadgetry and tails. The flying machine should be built as in simple, repairable simplicity as possible, compatible with weight considerations. Howcomb is reliable type structure, capable of sustaining large amounts of battle damage, ought to be strengthened. Current type structure from the development of being extraordinarily difficult to repair.

As things new stand, planes can be fixed faster a lot faster than they can be repaired. Modern aircraft pose a



JAPANESE workers in home plant work FEAMCOM-designed repairs before war...



REPAIRERS from depot work on downed U-8 aircraft to recover equipment and...



OTHER REPAIRERS examine plane which crashed in a Korean river but

extremely complicated problems. Patching up a North 1 plane is a lot different from repairing a B-29 jet.

In most instances, supplies are so short that the depots repair material they normally would pack.

• **Insane Problem**—Because of the immense task of supply at FEAMCOM is that its warehouse stock, over 300,

000 items, an average of 9,180 individual parts is classified every day. In the supply group, Col. L. D. Lavelle, believed it is the second largest Air Force supply base in the world.

To run the depot up, instructions, few sheets and procedures had to be used in Japanese—the 1,000-page Air



ANTHONY'S VERSION of the Jacobs Model 104 lightjet, four-place helicopter

Jacobs' Entry in Copter Field

Jacobs Aircraft Engine Co., a subsidiary of Barnes Steel Corp., is stepping up its activities with its entry into the helicopter field. Jacobs is packing a Gyroflex-type craft—Model 104—a four-place copter aimed at achieving a top speed of 185 mph, cruise at more than 155 mph. Three prototypes are scheduled for completion by the end of the year.

Strengthening its debut in copter circles, Jacobs has the foresight to assemble a group of experienced pilots using Gyroflexes. The design appears to mix both, major progressive ideas that have been achieved to accomplish high-speed flight. Included are a pusher propeller actuating with the tail torque rotor, v-shape wings that turn, flood fuel rails, extended diameter rotor, rotor blades and improved standard Jacobs 150 hp engine (RD75E) and power drive composed of a single unit.

Performance: Gross weight is around 3,510 lb. with useful load of 1,286 lb. and empty weight of 3,072 lb. One feature in helicopter circles is that of the shroud will enter the unobstructed useful load of 1,286 lb. at a certificated gross of 3,245 lb., it would appear to offer relatively good useful load performance in conjunction with both speed and the ability to hover at sea level.

In comparison with existing rotorcraft types, it is felt that it will remain extra maneuverable and easy to maneuver, reference to this at the 1972 fly country night in view of the helical features and other factors mentioned—robust water-pump propellers for auto and low-inertia fuel valves and pistons.

The engine modification incorporates as part of the basic shaft a friction and overrunning clutch, more rotor shaft, fuel shaft and fuel drive induction gear

box transmissions. The engine turns over in 10 sec and is reported to be a minimum 2000-hp/hr per hour-rated horsepower than other comparable horsepower copter models. Rotor hub is said to be 50% lighter than its conventional equivalent.

Engine induction is of helical and with modified Douglas contour. Four-leaf piston, five-leaf is designed to absorb 15% crash landing loads.

IATA Sets Tourist Fares for Europe

(McGraw-Hill World News)

Rome, Aug. 10.—Another step in providing cheaper air travel for most people through a tourist service to visit in Europe. On April 1, 1975, was announced by International Air Transport Assn. officials at closing of the sector's eighth meeting of the Committee and Joint Traffic Conference here (AVIATION WEEK June 9, p. 7).

While heavy flights will not be changed, the tourist class service will reduce fares on day services 20-25% below first class fares on distance services and a further 15% on night services. Half-daily pricing and the elimination of "extra" will make this possible. Passengers on these services will not be provided with free meals and baggage allowance will be limited to 15 kilos (33 lb.).

The organization points out the advantages of the system in making available air travel to many who formerly could not afford it. The tourist service plan for Europe closely parallels the North Atlantic tourist service inaugurated May 1, 1972. Service between

points in Belgium, Holland, France, Switzerland, Italy, Germany, Austria and the United Kingdom will be the first to be initiated.

With the exception of certain long distance fares between Europe, the Far East and Africa which were raised approximately 5%, the present level of first class fares remains unchanged. Steeper fares were increased by 5%.

Douglas Campbell of Passenger and W. Scherer of Panair do Brasil were elected to serve as Chairman and Vice Chairman of Traffic Conference for the coming year. Campbell, along with Dennis Anderson of SAS will be in charge of the next meeting, to be held Oct. 1 in Rome. The Conference just closed, with Argentina, Argentina is back and held under the Chairmanship of W. Scherer, NAL, vice president.

All traffic agreements made by the members of IATA are subject to approval by their respective governments before they may become effective.

The delegates were received by President General Juan Peron during their visit.

Top AMC Civilian Executive Retires

Denton, Ok.—"Mr. Permacrumb" of the Air Force has retired after 36 years of service.

He is William E. Donnelly, 62, of Denton, long a civilian executive assistant to military procurement director at Air Materiel Command here.

Donnelly was dubbed "Mr. Permacrumb" by Soviet engineers when the latter was assigned Secretary for Air Force. The name stuck. Donnelly only was the Air Force's most widely known individual in industrial circles. Family, military and industrial associates gathered in Denton recently to pay tribute to him at a luncheon held at the National Association of Manufacturers. Representatives Donnelly and his wife were presented with a sterling silver serving tray.

Germans to Survey U. S. Civil Aviation

Eight German civil aviation specialists were scheduled to arrive in New York yesterday for a month-long survey of U.S. techniques, with the help of the FAA's international experts, based in Washington.

Gerhard K. Hutter, a consulting engineer, will visit all transport airports and engine manufacturers here. CH the other seven visitors, six as expert assessors and one as an air traffic control expert. They will visit most large airports during their stay. The group will visit Washington, D. C. June 15-17.

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sonder to be considered as the basis of a long-term industrial free line.

According to the Automobiles the U.S. stands to benefit considerably from such a deal. There is a possibility that America would declare that it would limit its own military equipment to turning out supplementary aircraft and production of spare and equipment, while the bulk of aircraft plants would remain in the U.S. The U.S. would also have a stronger ally in this part of the world, using standard equipment.

Italy Coming To NATO's Aid

(Life/News IAN World News)

Rome—The international vacuum that existed in Italy after World War II is rapidly filling up. That is despite strong opposition by the government to rebuild the Italian Air Force, as proposed by the peace treaty.

Foreign Interest—A good part of the machine is being supplied by foreign weapons firms, most of them American, who have become aware of the big saving, labor and production resources that have been waiting away in Italy for lack of orders.

Republic Aviation has signed a contract with Pan-American for production of about 1,600 F-54 components. Bell Aircraft has concluded a licensing agreement with the Aeritalia Co. of Milan for manufacture of A-101 capture Production will likely take place in an existing factory, possibly Fugato or Montecatini Vespignoli di Comerio. It is expected that the A-101 will cost about \$2,000 each. Aeritalia is also believed to have secured the right to build large Bell models in the future.

The British have been among the first to exploit the Italian's surplus capacity. They were first permitted to rebuild the RAF and most NATO commitments. They long ago realized that stepping up their own production was going to be a long-term process—so were quick to seek outside sources such as the Italian aircraft factories which still have a production capacity in excess of the limited orders placed by their own government.

British Contracts—Here are some of the results:

- Fiat has two production lines working on DH Vampires jet fighters and supplying Vampire wings to the Royal Air Force. Fiat also has a large plant working on the later DH Venom fighters. The company has built a new factory in Turin for mass production of the DH Ghost engine.

- Maschi is building Vampire engines to use wings supplied by Fiat and is getting ready to start Vampire output

• Alfa Romeo has received orders from DH for 500 Copy Queen 16 engine engines and is preparing to produce the DH Ghost.

- An Armstrong Siddeley engine recently has been negotiating with Fugato to build jet engines, possibly the Viper type.

- Hawker Siddeley delegates are now negotiating contracts for manufacture of fighters for the Hawker Hunter jet fighter, one of Britain's "super priority" production projects.

- NATO Program—NATO's Defense Production Board is said to have agreed, following reports from its experts who visited Italian facilities, that these fac-

ilities are in a position to fulfill the supply program proposed for Western members of the pact.

Two groups reportedly have been scheduled. One covers production in Italy of about 300 Vampires to equip new European squadrons temporarily. The second concerns building over 1,000 DH Venoms all-weather fighters and equivalent production of other engines. Italian aviation people have said they could fulfill the latter program in one year's time.

NATO's production board apparently also has been considering the possibility of producing the Fiat G-93 as a light bomber for several countries.



OVER A QUARTER OF A CENTURY



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GROWING FACILITY at Montreal includes: (A), Plant 1—finishing section and engineering and administrative offices; (B), Plant 2—F-86 assembly; (C)—profile assembly line for T-33 and T-36 still to go; (E)—hangar in future preflight will go up this fall; (F)—new extension machine shop (built since this photo was taken); (G)—new workmen now going up.

Canadair: Ambitious Aviation Youngster

- Other people's designs have kept firm busy.
- But now company has its own CL-21 in the works.

By Irving Stone

Montreal—Canadair, Ltd., a comparatively youngster in the aircraft industry is doing a mighty and efficient job of design, production, modification and overhaul of aircraft. The company already is up to its neck in work, but it is facing its muscles and lacking for more.

The job—Canadair is turning out, under license from North American Aviation, F-86E Sabres and spare parts for the RCAP, spare for C-119 and C-119 type aircraft for the RCAP, USAF, and for IDMC and other airlines all over the world and is doing overhaul work on F-86s and C-119s.

Since the company will pull from new production lines the T-33 jet trainer for RCAP, under license from Beech Aircraft Corp; and the T-36 piston-



CANADAIR BUILDS SABRES for RCAP under license from North American Aviation.

powered crew trainer and transport for USAF, under license from Beech Aircraft Corp.

As if this weren't enough, Canadair

is making a determined effort to come up with a product wholly its own—a 31-passenger transport designed to appeal to local service operators all over the world.

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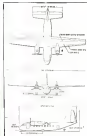
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Concorde CL-21

and maintenance costs.

The design's improvements over the DC-3 include:

- 32 seats instead of 21 in the standard DC-3 and 28 in the DC-3 coach
- 7,000-lb. payload instead of 5,000 lb.
- Cruise will be about 10,000 ft.
- 100-mph. full load cruise for the CL-21, as against 150 mph for the DC-3.
- The CL-21 could make four 60-min. hops on a single trip without refueling.
- Pressurization also would be included.

Short range operation is another key feature because of the frequent up-and-down schedule during a single trip. Convair to previous reports, the civil version would not have a rear loading ramp, but will have a door with built-in steps. It would have interior gear for a level floor, and the lowering and raising would facilitate loading.

Powerplants might be Wright Cyclone V12s, but equivalent Pratt & Whitney and Allison engines also are being considered. Cruise would be somewhere in the neighborhood of 120 mph, but speed in this type of plane isn't considered too important because of the frequent takeoffs it would be required to make in service. The plane is being designed to operate from a 3,500-ft. runway.

General design philosophy behind the CL-21 is that it would meet virtually all the requirements for low-cost operation, as described in the Air Transport Association's specifications approved last July by CAA's Prototype Advisory Committee. The plane's adaptability is extended to cover operation in other parts of the world, and to fit in for medium range operations as well as local service.

A military version under considera-

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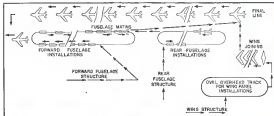
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PICTURE shows how Canadair installs its F-16's. This work is done in Plant 2, fabrication is done in Plant 1.



FINAL LINE (the left) mates complete fuselage. Forward fuselage oval is in foreground. Chert of wing lowering ribbons is at right.

box would serve as a trainer or cargo ship. The plane probably would have a built-in air wing.

Place of Its Own—Canadian officials feel that the CL-21 would not be competitive with the Convair 340 as the Merit 202 or DC-1 replacements because of the size and operating cost of these craft. It is generally known that U.S. operators would want to buy U.S. products and have been asking for a DC-1 replacement, but the report is that U.S. manufacturers couldn't touch such a new project for at least a year. This means an optimistic period of time to study in the transport field.

Meanwhile, Canadair is going ahead with design refinements for the CL-21 and with a worldwide survey to assess the market potential for the plane. If the survey is favorable, the prototype go-ahead will probably come this fall, with the static and flying models ready a year later. Probably \$34 million will be expended for three prototypes. A full-scale mockup is scheduled, together



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Du Pont Aircraft Explosive Rivets speed construction of wing section on Republic F-40 jet plane

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components coming from North America, the former. Then there was a switchback to the F-402, which Canadian delivered to the RCAP in March, 1951. (Another test article preceded this, but followed in part of time of delivery to RCAP.) Within 4 to 5 months after delivery of the first F, the company was up to production rate—18 planes per month. This in effect was a limitation imposed by USAP engine deliveries—the J40 GE-10.

New engine scheduled for the plane is Avco Canada's Orenda. This powerplant will give the Canadian-built Sabre more thrust, but it's still uncertain when the installation will be made. There will be some modification necessary to accommodate it.

Subcontract Help—Until the company reached the 18 per month output, it was doing all the work on the aircraft. In July, 1951, it started subcontracting. Today, all the tail surfaces, flap leading edge slots, canopy, engine duct, tailpipe, seats, landing gear and various miscellaneous parts are made or assembled by sub. Canadian turns out nearly all the sheet metal detail parts usually because the subcontractors don't have the necessary fabricating equipment. About 50% of the machined components for an F-40 are purchased at Canada, the balance being subcontracted.

Work on the F-55 is carried on in two main plants. Plant 1 houses the machining and sheet metal activity and engineering and administrative offices. Plant 2, located across the company air port from Plant 1, is the assembly area for the plane.

Machined and sheet metal components go from Plant 1 to stores in Plant 2. From stores, lots of one station's production go to the using station in many dayside the job.

Assembly Sequence—First operation in the buildup of the forward fuselage around the forward and intermediate fuselage duct sections. Fuselage side panels then are assembled to the stub duct not portion to form the outer fuselage fuselage section. These two body portions are mated to form the overall forward fuselage section. This mated to a sheet bulkhead which is the separation point between the forward and rear fuselage portions, and facilitates engine installation and removal.

The mouth of the assembly is done on a slight oil track leading lengthwise to the center of the building. At the end of this line the cockpit area is preassembled. From the straight line, the forward fuselage is taken to an oval pit for manual installation up to the sheet bulkhead. When the forward fuselage makes the swing around the oval, the engine is installed and the



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be switched. It will illustrate the farward bandpass, center wing and power plant package (pushover) forward of the forward.

Consider will submount all portion of the nacelle, outward wing panels, rear fuselage and empennage.

The T-55 line will provide the T-55 line in an adjacent line and generally will be operated in similar fashion. First of Generalized T-55 line should be off the line in May, 1953.



VARIABLE SCALE is shown here in an interpolating on a chart of properties efficiency. Transposition spring (at point) is a variable component of scale, provides minute number of engineering scale.

Variable Scale Eases Engineering Woes

A variable scale that can simplify most layout in making the addition as an NACA chart, using away other sets, is being manufactured by the Gerber Scientific Instrument Co., Inc. It is already in wide engineering use, primarily where there are large amounts of data reduction work to be done. It is proven to eliminate many engineering headaches and save designers' time.

► Easily Simple: The Gerber Variable Scale is about the size of the standard slide rule. The scale is a beautifully machined assembly of three main alloy with an attached reference point and a sliding one. It is divided by three parts in a spring, the least of the reference.

The spring is extremely accurate and subdivided, it is fastened to the left hand end of the scale and stretches toward the right. There are 100 coils in the spring, every tenth one is red, and the coil dividing the marks is half a penny. There is a yellow dot on the black coil. This spring is the variable part of the scale, and is actuated by the division of two, is divided based. Construction of the spring is such that, one side of the triangle has but within a series on the reading face of

Personal Opinion

One of the Variable Scale made by Gerber has been on the engineering desk at Aviation Week for some time now, and it is a considerable one. Before we wrote anything about it, we wanted to test it. Its biggest single use has been in scaling interpolated values from airspeed graphs. These are not seldom to be known scale, and before Gerber's invention, we were reduced to making two-point and other approximate scales from paper strips. We've also used it to transfer metric drawings, in which we had only a couple of dimensions, to English units. —DAA

the scale. The reduced lines making the scale slope off the paper being worked on at a 60-degree angle. Facilitates use of the scale.

► Using the Scale: Probably the best way to illustrate the use of the scale is with a typical example. Suppose you have a graph on 10 x 10 graph paper (the kind with light lines making every fifth division and heavier lines every tenth) and the person who plotted the graph originally marked the heavy lines with multiples of four.

To read the curves all you do is set the lead index of the scale on the origin of the graph, and stretch the spring until four of its divisions line up with the "four" point on the graph scale. Now you can move the scale anywhere and read points on the graph as the correct units, depending directly the stretching on the paper.

► Versatile Tool: This is only one type of example Joseph Gerber, designer of the scale, says that the largest single use of his device is in data reduction from wind-tunnel results. In this work, subdivisions of the second is set on the scale and points on the trace can then be read directly as proper units. (These instruments involve measuring the trace from some base line, and making the change of number of inches that must be a subdivision factor.) Use of the Variable Scale will at least have the advantage of ease for such data reduction, says Gerber.

Some of the other jobs include laying out rivet spacing on drawings, converting scales (such as metric to English measurements on drawings), making percentages in terms of a minimum estimate, initial layout and interpretation of order and graphs.

Price of the units varies with model and quantity ordered. Mailed in Gerber Scientific Instrument Co., 40 Spruce St., Hartford 1, Conn.

Subcons Share GE Radar Business

A small automatic radar built by Gen. Electric Co., Syracuse, N. Y., for fighter aircraft is made up of parts supplied by 234 outside firms, 73% of which are considered small businesses. In fact, one supplier who makes small aluminum extrusions currently being and tapped for small scores normally employs only two or three people.

On this radar project, 30 cents of each GE dollar for the small radar goes to outside firms, the company says.

The line recently completed in order

for large, complex radar from 1945 with the aid of some 500 outside suppliers and manufacturers, 73% of which were small businesses. These alone share about 52% of contract.

New Norden Plant

Norden Instruments, Inc., 34400, Camino, has had construction in its new plant in, scheduled for completion in a month.

Luscombe Contract

Luscombe Aircraft Corp., Guilford, Conn., has order contract with the Navy's T-34, advanced trainer. Value of the contract is in excess of \$500,000.

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FORWARD FUSELAGE is pure monocoque with minimum of stringers.



WING PANEL, partially faired, shows single internal structure of Broom-Lane.

Germans Producing Metal Glider

American-designed two-place sailplane is lightweight, low-cost craft; in limited production at Bremen plant.

Germany's first all-metal light aircraft, the Broom-Lane sailplane, is currently in limited production at the Bremen works of Ernst Nipp & Co. Designed by F. B. Lane, an American with the Civil Aviation division of the High Commission for Germany, the Vee-tailed craft has been built by permission directly at the Focke-Wulf plant in Bremen.

Lane told Aviation Week that the sailplane was designed to fill the need for a two-place training glider with good performance and reasonable cost. His experience on structural design of the Enterprise and other American aircraft had convinced him that aluminum alloy construction was going to be cheaper and lighter than the conventional wooden design which has

been employed as German sailplanes. Wing designer The rectangular form wing has an aspect ratio of 12.2 and a span of 52.2 ft. Wing section is laminar flow (NACA 64-612) and was adapted, along with the advice design, from the American BJ-1 sailplane, the first holder of the world's distance record.

Lane wanted to use a rectangular gliderbox to keep the cost down, but the span of 52 ft. wing was too great to design a full-cover-over structure. So above struts were the answer.

Structure of the wing is a single beam of sheet channel, with a heavy leading edge skin to prevent nose-in deflection. Control surfaces are metal monocoque with integral skin stiffeners. The fuselage is monocoque; it



Broom-Lane Sailplane

SPECIFICATIONS

- Wingspan 52.2 ft.
- Length 25.3 ft.
- Height 7.2 ft.
- Wing area 275 sq. ft.
- Aspect ratio 12.2
- Empty weight 900 lb.
- Gross weight 1940 lb.

PERFORMANCE

- Best glide 1:27
- Maximum landing speed 2.1 kts
- Two place landing speed 1.5 kts
- Wingspread 40 mph
- Airplane true speed 100 mph
- Load factor - 8

contains a single landing wheel in the belly hole in sole struts is used for reasons of visibility, lower costs and towing advantages. The uncovered fuselage adds to the short struts, but does not necessarily affect the performance in the usual speed ranges, and range.

A short but deep wing of Flügels was used to maintain forward line over the junction of wing and fuselage. The Vee-tail was used for the usual reasons of lower cost, less drag, easy assembly.

The sailplane is easily transportable. Each wing panel detaches with removal of three bolts, and the tail folds into a vertical position. Assembly is claimed to take only five minutes and control couple automatically opens assembly of the canopy.

Empty weight of the Broom-Lane-180 is, a sheet 100 lb. less than are competitive German designs. The one is estimated at about \$1,500, \$1,000 less than similar German types—DAA.

High-Altitude De-Icer

De-icing equipment for high altitude flight is new development of Lockheed Aircraft Corp. Device is a metal boot for both military and commercial aircraft that provides up to 75 volts per sq. in. of surface. Following tests on top of Mt. Washington, the new equipment is being tried out on an F4U.

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TWIN-ENGINE Tri-Factor 325 presents weird appearance, but outfit's designer



HAROLD A. WAGNER, claims his overlapping prop scheme safety, performance

Prop Overlap Scheme Tested

Improved single-engine safety factor is the goal but noise and vibration problems are still unsolved.

A series of experiments in developing a novel propeller arrangement to provide light planes with improved two-engine safety factor is being carried out in Portland, Ore., by Harold Wagner, industrial machinery maker. His approach is to group the propellers close together to minimize yaw when one engine cuts. The safety factor states required prop. overlap, and propeller tip clear the shaft of the engine by only about two inches.

Wagner's latest trials squared modification of a standard Piper Tri-Factor into the configuration shown above.

Twelve he had "staggered" two Piper Cubs (Aviation Week, Mar. 27, p. 59) at a cost of about \$2,500. The Twin Cub took off in less than 100 ft. with two stalled, had maximum side of climb and its speed was up 15 mph. over the conventional type. One-engine take-offs were made with ease, Wagner reports.

The only serious snagged has to modify the Tri-Factor, hooking another engine onto a single fuselage. The project entailed considerable work, with total cost, including the surplus, of \$9,000.

To maintain CG, Wagner had the engine positioned 1 in. lower and 11 in. to the rear from original. The additional nose weight was believed to be adding 10 lb. of ballast in the tail.

Additional strain was placed from the wing to the engine mount to take side loads, a dual adapter was put on one prop hub to permit clearance, exhaust stack system was shortened and rear wing, and a fitting added reflecting movement of the fuselage so it wouldn't feel the prop.

Originally Wagner intended to cover the engine with a single cowling, but ran into vibration problems, the power plants now are only half-cowled and run cool and very easy, especially at unpropagated high speed. But Wagner has found that he can get the same down to a satisfactory level when running the engines at about 180 rpm. less than for normal cruise.

Although he hasn't given out any figures, Wagner claims the Tri-Factor has 140-hp. (140-hp. and 140-hp. performance). Cruising speed is up about 15 mph.

Wagner has been a private pilot since 1915, has a flight strip on the grounds of his plant.

Metal Bonding for Wings

Lockheed Aircraft Corp. plans to start a production department specializing in metal bonding, drawing on two years of research and tests. First step planned to be to fabricate an entire wing panel joining edges by Super Conva-

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What every pilot should know about MICRONS

(Pssst! What you don't know *can* hurt you!)

"And what," you ask, "is a micron?"

Answer: "Micron" is an infinitesimal, and you'll want to know that both—the size it represents and the sound it keeps out of trouble. Here they are:

1—A micron is a measurement of length. You remember that 25,400 microns equal one inch... and then take it from there. Know how so, at your hangar-flying sessions, don't put any "width" when you see any "5,600,514,000 Microns"? The boys will be amazed.

2—A micron, rhetorically speaking, is a particle having a diameter of .000015 inch. Engine manufacturers even that particle bigger than 18 microns in diameter can be dangerous to your engine. Five particles of that 30-micron size would have to get together before you could even see them with your naked eye, even if you have CAA physical shows that you have 30-30 vision.

But when these incredible particles get into your engine—much ear! They can cause damage or worse wear. They could even cause a major failure and a forced landing.



How do they get in?

They get into your engine with the gasoline—originally of the brand you use. No matter how careful it is, this potent form industry no longer, gasoline can't help picking up airborne dirt particles, including small and rare.



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How to trap the little miscreants

How can you trap these particles—keep them out of your engine? Not with one simple answer. And carefully use with ordinary kerosene. The only solution is to filter the gasoline through specially designed filters—just ahead of the gasoline hose—before it goes into your tank.

So that's exactly what Gulf is doing for you. Gulf has created them on its Aviation Gasoline dispensing equipment, designed to completely remove all particles 18 microns in size or larger. From now on, for the sake of your engine and your own safety, go GULF—get gasoline that's refinery clean.



Jet Forecast

- Douglas official sees jet transports 5 years off.
- But expects turbojets year before turboprops.

It's a pessimistic—but probably realistic—view of the immediate future prospects for a U.S. jet transport that Arthur E. Raymond, Douglas Aircraft's vice president-engineering, said in his "outgoing capital for 1958" letter. He named, who talked a secret talk (before the Air Industry & Transport Association of Canada). The Raymond Capital said that 1957 would be a good target "approximately" for the first U.S. jet transport with operating costs comparable to present-day levels. And contrary to British expectation, Raymond said the turboprop transport is more before the turboprop transport to the United States. (The turboprop transport is currently used in service before the turboprop. About recently began regular operation.)

Reason behind this line of thought is that most use of the turboprop is concentrated along military lines, and military stress is on turboprops.

• Jet Transport Problems—Turboprop engines, Raymond said, are a 1957 story for the industry. By 1958, the turboprop engine of low operating cost should be available. He said that the engine people might want to push a light about these dates, but that his firm was for engine development and work.

On ground operations with jet transports, Raymond suggested that tractor or other auxiliary engines be used for maneuvering the craft around.

Takoff design should be constructed, with water injection held in reserve for hot days or high-altitude fields, if this proves the most satisfactory way to get additional temporary power.

Large pipe dimensions will be essential. Reliability of the pressurization system is an absolute essential, and good proofs are problems. Glide speeds on approach will have to be reduced by auto-braking landing.

Landing aids will have to be greatly improved over what they are now, and a Raymond Arrangement brake will also have to be used for acceleration and deceleration control during landing. Key trials may move the emergency ear-clip drop parachute or ejection gear.

• Jet Performance—Accordingly, the jet transport is going to be a complex machine, which everyone has agreed upon in the past. But Raymond predicts another single which had not received much emphasis.

He said that the designer has to



SS White Flexible Shafts



Have to measure up to high standards to meet the rigid specifications set for Air Force combat craft. But doing this is not unusual, as the case of these present Republic F-84E Thunderbolts will testify. Thunderbolts, used to active combat in Korea, employ eight SS White flexible shafts in varying capacities as well as SS White actuators, pressure braked fittings and adapters.

As a means of rotary control and of transmitting rotary power, SS White flexible shafts are also the aircraft service. These shafts "Metal Muscles" are less vulnerable to damage than most other types of remote control and power drive systems, and are unaffected by the stresses of high aircraft speeds and extremes of temperature.

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choose the lowest cruising speed below which the aircraft will meet passenger comfort. If we choose that last too low, competition may necessitate us, if we choose it too high, practically all of the characteristics of the airplane other than speed will suffer."

"While this is not an easy decision, it is not as difficult as it sounds because the spread between the highest and lowest cruising speed we are likely to choose amounts to only about twenty minutes in flying time on a 2500 mi. flight."

The growth through modification of transport aircraft—namely might be the Douglas DC-4 to DC-5 to DC-6, or the Lockheed Constellation to the Super Constellation—will probably not be a feature of future jet transports, says Raymond. The freighter will not be capable of much extension because it will be designed at maximum length in the first place, and engine power changes will not be as rapid as they are now. The whole initial design will be new hence in order to give the high level of efficiency expected.

Cost and Use—The continued spread trend of aircraft cost would be a bit bit, says Raymond. As one check point, he gives today's hypothetical price for the DC-5 which originally cost \$114,000. The identical aircraft, if it were in production today, would have to cost \$150,000.

So the only choice aircraft has to balance cost and give it a new jet transport is through quantity production. But quantity production problems are pointed out in the most acute form by the jet transport. Because of its speed, one jet can do the job of two conventional airplanes of equal size. Also its utility will be somewhat restricted and it may have to share a future market with turbo-prop aircraft.

Multi-Purpose Plane—do Raymond expects the designer of a new jet transport will try for a multi-purpose aircraft. He will make it adaptable to all kinds of payload and to meet the comfort of engine, he will build in all reasonable possibilities for growth.

On turbo-prop aircraft, Raymond says that until the operational cost becomes lower than a turbo-prop engine plane, the speed advantage of the turbo-prop to a jet will not give the former much of a leg on its life. The turbo-prop aircraft can't be expected to pay off until a mile or so after the turbo-prop transport has long since paid its way. "The fact that, if propeller development keeps pace, the turbo-prop will also require a different wing than current transports."

Defense Needs Mean Scrap Pot Your Scrap Back to Work



Engineered for Close Air Support

Lessons learned under fire in the deadly freight battles of Korea have dictated the specifications for America's latest attack-type airplane—the AU-1 Corsair.

Retaining the basic design features of the famous F4U Corsair, the AU-1 is powered by a Pratt & Whitney R-2800 single-engine to give the aircraft its low level performance. Extra armor plate

has been added to protect pilots from ground fire, and numerous internal changes have been made.

Thus once again the basic Corsair design, first laid down in 1938, has shown its amazing capacity to be adapted for specialized tactics in a dozen years of uninterrupted production, more than 12,000 Corsairs have been built. Six versions of this one airplane type have seen action in Korea.

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Efficiency Will Pay In Renegotiation

The U.S. Renegotiation Board states that a defense contractor who demonstrates unusual efficiency, with resulting saving to the government, or who makes an unusual contribution to the defense effort should reap a reward in keeping with his achievement.

This is one of the tenets of the board's policy which are being outlined to industry in talks by John T. Koehler, board chairman, and other negotiators and spokesmen.

• Opposes Pareto-Rochelle is strongly opposed to any attempt to solve its negotiation problems by reducing them to a formula, or acts of formula, particularly a formula of maximum and minimum profit standards.

Congress must wait it out when it made it mandatory upon the board to give favorable renegotiation to the efficiency of the contractor and when it required the board to take other factors into consideration," Koehler declared in a recent talk before the American Management Assn. in New York.

The other factors he listed as the consideration of cost and profit, skill work, risk assumed, nature and extent of contribution to defense effort and character of business.

• Fundamentally the points which the Renegotiation Board chairman has taken fundamental to renegotiation are:

• Statutory renegotiation should be applicable as no competitive system only in control or total mobilization, or under wartime and during in special peacetime emergency.

• American industry should realize that it is not being government industry is often more profit to the government is essential to recover from the changes that industry is making more than a reasonable profit to defense activities.

• Renegotiation is an instrument of price and cost control, not a taxing device.

• Determination of excess profits should be made by disciplined policy.

• Renegotiation must be administered fairly with equal treatment to even contractors.

• Renegotiation must impose the lightest possible burden on America's ability, increasing manpower and money spent on reports, forms and on losses.

Speaking at a recent session of the Committee Institute at Cincinnati, Paul F. Wenz, director Office of Accounting, Renegotiation Board, reviewed the primary purpose of renegotiation. The board, he explained, is

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to ensure all income received by a contractor from negotiable contracts with some 19 specified government agencies, whether prime or subcontract, is distributed whether the contractor has realized excessive profits and to reach an agreement with the contractor as to extent of excess profits.

Philip Nichols-Ward and that the board rates heavily on figures provided by the contractor, and that only such is it necessary for the board to audit the contractor's records at his plant. A statutory maximum of \$150,000 applies to negotiable contracts.

The Representative Board's general counsel, Philip Nichols, Jr., another speaker at the Committee meeting, discussed the problem of negotiating or negotiable business from that which is more acceptable. Many problems in subcontracting. The board has been so dissatisfied by Congress to exempt sub-contractors when it is not feasible to negotiate profits attributable to them.

Stock Exchange—The effort this is, emphasis, the board has decided to exempt stock firms purchased in normal course of business. This means that if a manufacturer buys raw materials and uses them not in the same but in other military and civilian market products and there is no special treatment for the raw materials and for military products, all his purchases of raw materials and for military products.

However, Nichols explained, special items purchased for use in military products, or items incorporated in the plant or any by special order, in a special plant with its special customer, are not exempt.

Zero Expands

Zero Mil-Cos has taken over the 14-year-old precision metal fabrication firm, Zerod Mil-Cos, Rockford, Calif., and installed James M. Doherty as vice president and general manager. Head of the new firm is John B. Gilbert, formerly with Chrysler Aircraft Co. Zerod made its mark in World War II with development of the odd-shaped deep drawing necessary for the "Gibson Cad" magnesium transmitter. Chrysler also made their metal parts to replace high-cost castings during the war.

Zero intends to utilize the deep drawing process in producing intricate parts demanding close tolerances and high grade finish for electronics, aircraft and jet parts.

K-F to Hire More

Kaiser-Frazer Corp., Dearborn, Mich., expects that its employment will rise from 600 workers at present to about 1,100 by fall. K-F is building Wright R-1600 engines for USAF to be used in fighters and fighters.



The C-47, as under, shifts the C-47 also in flight.



From ballistics, and others, how does the C-47



More, it perhaps will supply 'up front



Flying hospital speeds around in U.S.

Quick-change star of the Air Force

The Boeing C-47—already the most versatile transport in service—has qualified for another job: the supply of freight from the U.S. to Europe. Now there is a call for the C-47 to handle such heavy forward and rear equipment in 15-ton boxes, bundles, and roll-in-cases (bushings). Lighter equipment can be packaged to the same effect.

This unique versatility makes the B-29 bomber, virtually a one-plane aerial transport force. It is convertible from one type to another in a matter of hours, so that a single fleet of C-47s is available in one form or another of less versatile units.

Suppose total cargo is needed in a hurry, half a globe away. Each C-47 can take up to 10,000 pounds of freight from the U.S. to Europe. Now there is a call for the C-47 to handle such heavy forward and rear equipment in 15-ton boxes, bundles, and roll-in-cases (bushings). Lighter equipment can be packaged to the same effect.

These same tanks convert readily into transport, that carry up to 10,000 pounds. Another quick conversion and the plane flying between the two has been put into the air—change for as speed, capacity and passenger cabin.

Other advantages of the C-47's were light, maintenance and ease training are simplified and it pays as well in both directions. As a freighter the C-47 flies cargo from the United States to Japan and in Europe, makes the return trip as a hospital ship or personnel carrier.

Boeing designs made the C-47's the most versatile multi-use transport in service. Boeing production facilities now there are in Europe. This is the same design and manufacturing research that produced giant fleets of rugged B-17 Flying Fortress and B-24 Superfortresses during the war and later, the B-29 and the new jet B-47 Stratojet bomber.

In the Air Force, Boeing built the

B-47 STRATOJET

B-24 SUPERFORTRESS

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and is now offering production in the B-47 Stratojet bomber

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McDonnell F3H-2 "Phantom"



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School Jet

- Northrop Aero Institute designs baby turbojet.
- Plans are to fly it in Ryan Navion testbed.

Northrop Aeronautical Institute students have recently completed a four burner baby turbojet, slated for installation and flight tests in a Ryan Navion. The baby jet, called the Centriflow, puts out 140 lb. thrust and weighs only 172 lb. It is the third in a series of small jet engines developed at the institute. There are no plans for its production.

Design, development and construction of the unit were done by students at the institute under the direction of William L. Taylor, principal instructor.

Advantages of the current model over the earlier two jet projects at Northrop involve primarily structural improvements, a fuel consumption and overall efficiency.

► **First Project**—In order to describe the new Centriflow engine adequately it is necessary to know what went before.

First Northrop jet engine project was a simple conversion of a General Electric R-33 turbocharger. The first school powerplant had all the basic components of a turbo engine, including compressor, turbine, oil-cooled lubrication system, fuel control system, and the like.

The first engine (designated MAE Project 151) was designed to give 200 lb. thrust and weigh about 160 lb. It was compressed centrifugally and burned in a reverse-flow combustion chamber.

The combustion chamber used the now familiar inner liner and outer shell. The burner was perforated for air flow; the compressor air entered the outer shell, passed around the liner for cooling and entered the inner liner for combustion.

All the turned parts were made of stainless steel sheet, simplifying almost latest work and the design and fabrication simplicity.

► **Second Engine**—Parts of this first construction were disappointing, the expected thrust never developed. So the institute decided to try a second design, using the through-flow combustion scheme rather than reverse flow.

Rest of the engine was also the GE R-13 turbocharger. Before fabrication of any hardware, theoretical cycle analyses were made which indicated that such an engine would in fact show improvement over the reverse-flow unit. After centrifugal compressor in the No. 2 job, the air goes into a collector



REVERSE-FLOW

turbine was first of series designed and built by students. Expected thrust of 200 lb. never developed.



THROUGH-FLOW

turbine, the second project, used four burner and through-flow combustion. Design thrust, 200 lb.



CENTRIFLOW

is the latest project. Design thrust is 140 lb., weight is 172 lb. Engine is slated for flight tests in Ryan Navion.

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ing which distributes the air to four convection chambers. These latter can be tilted downward from the full diameter of the collector ring toward the engine shaft. After burning, the gases pass through the radium wheel and out the tailpipe in the usual manner.

This engine was designed to give a thrust of 200 lb. at a rated speed of 21,000 rpm.

► **Catflow Design**—The Catflow is an advanced design based largely on the experience of the school with the second engine.

Following the inflow through the engine, the first design change is in the outlet of the collector ring. Where the second engine took air to the houses at the full diameter of that ring, the Catflow collector ring carries from the air to parallel the axis of the engine at less than the engine ring diameter. This allows the use of combustion chambers parallel to the thrust axis of the engine.

The burner assembly was redesigned to replace the scheme of welded-flange connections with stamped-ring arrangement similar to the usual large-engine practice.

Burner chambers with the modified to improve combustion efficiency and lower the temperature of the outer shell. The flame tubes (sometimes called cross-fire tubes) which connect the houses on the engine now feature a bell-type expansion joint.

The Catflow is also a cleaner engine externally. The entire engine was built on a welded tube frame; Catflow has a sheet metal frame which can be used to mount the engine cooling in air.

► **Flight Tests**—Northrop Aeromedical

Institute proposes a program of flight tests for the engine, with a Navion as the testbed. Idea is to start tests after the Ryan Navion has become airborne on its own reciprocating engine, then cutting in the jet.

Later tests will use the jet engine to fly the Navion after takeoff and after shutting down the reciprocating engine, with final plans calling for takeoff and flight with prop feathered, on the Cessna trainer alone.

Catflow was entirely a classroom project introduced to combine design and fabrication techniques into a modern package. General design of the jet engines began in the junior-high class as a class effort. After design was frozen, different components of the engine were assigned as drafting problems for assignments and engine design course. Students carried the design through from design to finished product.

Magnesium Casting Output to be Raised

Extensive machine tool replacement and expansion of production facilities for magnesium castings are slated to follow the recent transfer to the Navy of Bendix Aviation Corp.'s government-owned Rolapac-Powertech device located at Teaneck, N. J.

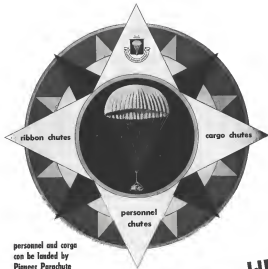
Edgemo-Powertech has operated the facility since 1941 and is currently supplying about 200 customers in the aircraft industry. The company will continue operation of the expanded facilities, under Navy direction. Output will go primarily to meet the industry's increased demand for magnesium castings.



MODELS SHOW THE WAY

Detailed model layout was prepared by Bridgeport-Loring division of Area Mfg. Co. to show exact portion of every machine used, and each machine is presently used in exact that production change requires. Even the structural sup-

porting columns have been placed in their proper position. This layout was made up while the company studied the famous Chance Vought Aircraft facility at Bridgeport, Conn., for production of the Wright R1820 engines of 1,535 hp.



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THRUST & DRAG

Integration in a smart aerodynamicist. Design a quiet air conditioning system for an airplane, keep your hands and other sensitive places. Two in several weeks I've had to allocate exactly the making one of air coming through ducts and outlets in order to have a speaker. First year the noise goes to General Electric's Lockheed plant, where the level of sound in the administration building during most compact favorably with a J47 on test.

The struggle between proponents of hydraulic versus electronic controls was witnessed recently in a speech by Allison division's D. J. Nolan at the recent SAE National Aerospace Meeting. Nolan said that the hydraulics have been so improved with the success of electronic fuel controls that they are going to be designing a hydraulic television set.

Most startling recommendation for noise reduction around airports came out of the same symposium conducted at the SAE National Aerospace Meeting. The speaker had just presented a very scientific plot (which he spelled out later) of noise level as a function of aircraft type and direction. Then he stated that one way of reducing the "noisy" noise level area was to direct the aircraft noise directly after takeoff. And he suggested that it might be well for pilots to fly a lot closer to the stall after takeoff so as to avoid local complaints about noise. Presumably if I were flying I'd either take up a few people in Queens or Bushwick, riding at low altitude is so fast.

Canada's National Aeronautics Establishment has been conducting a series of tests on a North American F-86A. Some of the tests operated by Royal Canadian Air Force squadrons. Present use of these tests is to establish the ballistic flight relationship between lift and drag coefficients.

In measuring lift: cross flow to the engine, the Canadians found that boundary layer thickness at the nose induced the geometric inlet area by 20%, causing a corresponding decrease in inlet flow. Direct measurements showed that the effective throat of the F7C-13 engine is reduced to the plane of about 200 lb less than test bed throat.

The NAE also reports that Mach 1 was exceeded on test flights, and notes from the expected changes in aircraft behavior, nothing unusual happened. The expected "bump"—referring to the explanation earlier reported to follow the jump through sonic speed—was not heard on the ground—DAA.

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Precise machining is costly! Wright Aeroengine safely avoids the expense of this crankshaft assembly with a protective wrapping of Permacel 77.

Shown above is just one of the hundreds of cost-cutting, time-saving uses for **PERMACEL** and **TEXCEL** Tapes in the Aviation Industry.

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VULCAN NEEDED AN ANVIL...

But Philco forged a mighty weapon with a change of name! When the Armed Forces needed vast quantities of Microwave Radio Relay equipment, Philco's standard commercial product met the exacting requirements without change! Philco Advanced Design Microwave already contained JAN-approved components and military type plug-in assemblies. So with only the change of name from Philco Advanced Design Microwave to AN/TRC-30, it was ready for military use.

Philco Microwave equipment is designed for utmost reliability, flexibility and ease of maintenance... qualities demanded without compromise by the Armed Forces. Philco's ability to surpass these rigid standards provided the Armed Forces with an immediate source of vital communications equipment.

Today, as always, forward-thinking Philco stands ready to develop and produce advanced electronics equipment to meet any need of the Government and the Armed Forces.

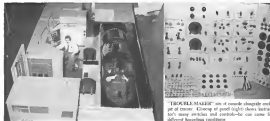


PHILCO CORPORATION

GOVERNMENT AND INDUSTRIAL DIVISION

PHILADELPHIA 34, PENNSYLVANIA

AVIONICS



"TROUBLE-MAKER" sits at controls despite mishap of crash. Group of panel lights shows Link's many switches and controls—he can cause 35 different hazardous conditions.

Link Simulator Boosts B-47 Potential

New USAF training device uses mass-production techniques to speed limited production item.

By Philip Klein

Hughes, N. Y.—When the Air Force can substitute a few hundred vacuum tubes, 15 miles of wire, and some other common components for a scarce B-47 jet bomber and when the substitution takes a better job to safety aspects, it is not like "feeding" a Shogun.

That is why Link America's new "vacuum wonder," a B-47B flight simulator, should prove an important addition to the AF's training arsenal.

Like Most B-47s—The B-47 simulator, and others which follow, will make some B-47s poised and ready to strike at a potential enemy. And here is why.

It's a big transition from slow four-engine B-29s and B-50s to the speedy jet B-47 which handles more like a jet fighter than a bomber. Jet fighters have been used for jet bomber trainee training, but they still have a big gap.

The result is that Strategic Air Command must direct B-47s to Training Command, or even devote one to pilot training when it should be concentrating its attention on strategic bombing techniques.

For many phases of B-47 pilot training, the new Link simulator is better than the actual airplane. This is so, because it

•Permits closer supervision of trainees by instructors (time spent inside punch that would be possible in B-47 with its tandem seating arrangement).

•Operates up to 24 hours per day, two or three, with no time out for air plane maintenance, engine changes, etc.

•Subjects trainees to many emergency conditions (engine failure, low, long, etc.) without risking loss of life or air craft.

Link Model—The B-47 simulator is salvaged from a design standpoint because Link uses new standardized or made and electronic construction to permit mass production economies for a limited production item. The "big" version of the new simulator is a complete replica of the pilot-to-pilot system in the B-47B. Instruments can make radio and navigation aids, and other features faithfully copy the airplane.

Link has even included electrical control buttons which can be used to "pop out" in the simulator to simulate electrical short circuits.

The seat belt is how close the Link B-47 duplicates the flying characteristics of the actual airplane. Capt. H. R. White, an AF pilot simulator with more B-47 hours under his belt, couldn't give a single instance where the simulator failed to mirror the airplane. Link officials said that half a dozen

other B-47 pilots who have flown the simulator were equally enthusiastic about it.

Link's faithful reproductions even incorporate an undetectable airplane characteristic—oilman's sweat. At various altitudes and speeds, displacement of the B-47 allows sweat the plane to turn in the opposite direction from normal. The Link unit does likewise.

Flight Routine—During landing approach, motion picture pilots find that when flying jets they don't decelerate as fast, and that soon to find. The pilot has to move down the plane to check the runway. The most use the more technique with the Link simulator.

The B-47 simulator pilot will find his CG changing with fuel consumption or the jettisoning of bombs and fuel tanks just as it would in the actual plane. The simulator also accurately copies the sound of the engine, the sound of the propeller, the sound of the landing gear, and several other (AFTR).

If the pilot finds the simulator to approach still conditions he hears a warning buzzer and the control column begins to shake. Link even tries to fool the pilot trainee's ears by providing a high pitched whine and scheduling noise in the background to duplicate the sound of the jets and the wind stream. Link admits that there are some areas for improvement in their audio equipment.

•Before Link—It's the original Link trainer. The B-47 simulator is a somewhat more Link's chief engineer,

NOW SAFE FLIGHT BRACKETS THE PRE-STALL ZONE



New Safe Flight, pioneer in stall instrumentation, offers progressive pre-stall detection to provide not only infallible pre-stall warning but also as backup precisely the best landing approach speed for any gross weight condition.

The new multiple sensing unit on the wing's leading edge triggers the Safe Flight consistently-mounted vish shaker which operates with variable amplitude to provide artificial pre-stall warning plus approach control with more precise definition and more exact margin than possible by any aerodynamic buffeting.



Simply DIAL Your Pre-Stall Margin!

Safe Flight stall instrumentation system now incorporated this adjustment dial to permit simple exact adjustments to any desired pre-stall warning margin for ideal approach speed control.

Safe Flight stall instrumentation system now standard on many export version, airline and commercial aircraft. Your inquiry will bring prompt response from our engineering staff in choosing your pre-stall instrumentation problem.

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W. W. Wood, asserts that the elements of movement or acceleration forces on the torso may detract from the cockpit simulation of actual in-flight operation. However, he says, experience to date shows that pilots become so pre-occupied with the nature of their flight duties as the simulator that they don't appear to miss the constraints of motion.

Wood points out that research is needed to determine to what extent motion and/or acceleration actually contribute to complete simulation. He warns against introducing highly-detailed motion or acceleration which differ from those experienced in actual flight.

To introduce motion into the B-47 simulator would require its own, completely and not necessarily ideal psychological research points set which motion are needed. Wood doesn't feel the added expense and complexity is justified. That explains why all present day simulators (Lock, Martin-Wright, etc.) use stationary devices.

► **Visible Motion**—The instructor sits before a control console inside, all joining the pilot/co-pilot section, which enables him to monitor the trainer. Switches and controls enable the instructor to cause coordinating, swing, or complete failure of one or more organs in the simulator. He can cause up to 65 different potentially hazardous conditions, including instrument failure, fuel or hydraulic system failure, fire, and others.

This feature gives the simulator one of its biggest advantages over the actual B-47 in terms of pilot training. Trainers can be subjected to contemporary conditions and again until their complete counter-measures become instinctive. This can be done without danger to the pilot, instructor, or the airplane.

The instructor's console contains a large oscilloscope which continuously plots the progress (yawed position) of the simulated flight. Two smaller monitors show the trainer's ability to track the glider's path and location, based on ILS approach. The instructor has two deviation indicators to permit him to "buff" down the trainer in a simulated GCA approach.

► **No "Electronic Brain"**—Although the Lock B-47 simulator uses some 700 vacuum tubes, it is not an electronic computer in the strict sense of the word. Rather, it is a group of electro-mechanical adding computers which are designed to solve the complex equations of motion that determine the attitude and flight path of the B-47 for any one attack of flight.

When the pilot-brace, for example, moves his control column forward for down-elevator, an electric signal indicates



How do you Guide a Missile?

WHAT does it take to put a "brain" in a projectile —a "mind" that makes it know where to go, and when to explode? For that matter, how do you open garage doors and light the driveway at the beep of your horn — or show out our freight package from thousands in a food-packing plant?

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Specifications: temperature range, -131°F to +200°F; pulsations to -70°F with 1000 lb. steam load within 1 hr.; humidity 2 to 98% at -70°F; relative humidity, 90% to 99% at 15,000 ft. Maximum flexibility and ease in setting up tests are insured by a bank of 144 individual connectors and 11 high-voltage feedlines.

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For further information without obligation, write Tenney Engineering, Inc., Dept. G 26 Avenue B, Newark 3, New Jersey.

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Engineers and Manufacturers of Environmental Test Equipment

have therefore laid out their avianets with an eye to maintenance rather than to weight and space-saving.

Most electronic avianets (on rough, 10 x 20-in. sheets) mount on five-out roller racks so they can be quickly pulled out for inspection or maintenance. Individual components are identified by part number either on the component or on the chassis. Resistor and capacitor values are terminal boards for easy access and replacement.

► **Reliability**—With its 704 vacuum tubes, the B-47 avianet takes the question of reliability. Wood reports that Link has had only a "couple" of tube failures during the 1,000 hours of test and stage in the first unit.

One explanation of the phenomenal (to avianet) engineered reliability is that the avianet's tubes have a comparatively easy environmental life—no shock, vibration, or extreme temperatures.

But there's another important reason Link has stuck largely to old reliable tube types like the 6X5.

In addition, Link says they need their tubes solely for gain or amplification and not to "take compensating circuits." This means satisfactory operation even for possible changes in tube characteristics and to eliminate the need for control tube selection.

Although their equipment doesn't have to meet the rigors of an airborne environment, Link subjects it to "hot-box testing" to be sure that it will survive long periods of storage and storage.

As an indication of the good reliability they expect from their new B-47 avianet, Link cites average experience with their C-11A ground purpose jet trainer. Link says the C-11A has powered 95% operational on a 54-hour week in-use basis.

► **When Trouble Occurs**—With its complex system, trouble-shooting would be difficult. To ease the problem, Link has incorporated a special test provision on each major chassis. This permits it to be set to any desired value and "bypass" "buses" at that value. In this way a service man can isolate and track down faults.

If the service man fails to return all units to their normal operating positions after his checks, a warning light shows on the avianet's panel.

► **The Future**—Link is now turning design attention to an F-105 (Scorpion) avianet for the Air Force. More B-47 avianets are under way. They also have a dozen other unspecified projects including a gravity tractor for the B-36 experimental launch.

Wood admitted that Link has its eye cocked to the possibilities of using transistors and magnetic amplifiers. However, Link's experience with tubes provides little incentive to change.



ROBINSON ENGINEERED MOUNTING SYSTEMS ARE SPECIFIED

The B-36 is a defense airplane and a mighty weapon. Its piston engines alone peak a total of 68,000 horse power. It takes on heat to warm them up. The winging ship stream, during the long run-up, causes extremely heavy vibration and confusion of the air section and tail of the airplane.

The numerous electronic equipment installed here was at first inadequately protected by "stuck type" shock absorbers. The equipment was shaken and rattled. Tube life dropped from several hundred hours to less than 10. Equipment failure was constant, sometimes seriously affecting the success of the mission.

That is why you will now find 20 Robinson Engineered Mounting Systems aboard the B-36. They are designed to meet the specific conditions of vibration, confusion, weight and center of gravity under which the equipment must operate in order to secure the successful completion of the assigned mission.

Robinson Systems have extended service life from vital electronic components. They "give" freedom, provide protection beyond present military specifications and a wide margin of safety for the extra loads of combat maneuvers. Robinson systems are all metal—constructed by temperature, shock, or age.

IN TODAY'S AIRCRAFT—ROBINSON MET-L-FLEX MOUNTS



Traffic control units often produce shock loads above 1 G. In today's high performance aircraft these shocks must be absorbed in mounting from control of following the high damping and isolation protection needed to keep vital electronic equipment in operating condition.

Robinson mounts are made to absorb resulting from compressed forward force and be protected from vibration and shock. With new MET-L-FLEX systems and multi-developed shock absorbers and isolation these units—providing accurate instrument readings while on the ground or in the air.

Designers have many special problems of design and mounting problems in this type of aircraft. Robinson mounts are usually installed in areas where they are most needed. They are made to last in order to provide new type of vital instrument systems and safety for the aircraft.

There's a Robinson Engineering System for you. You know what you're "plus" because that's what Robinson's Call to write today.

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Compared with ordinary type heating systems, this new South Wind package provided Beech with a unit 25% to 50% less in weight. A unit 30% to 60% less in initial cost. A unit with up to 30% less service requirements, service costs and spare parts requirements.

Ideal for large cargo planes, large main-engine transporters and ground heating in support of these aircraft, this new South Wind Central Heating Package affords savings never possible before in aircraft heating. Why not find out why yourself? Check—right now—the performance advantages shown below. Write South Wind for complete details today!

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1. Output 148,000 to 700,000 BTU/hr. Consistent heat flow. Eliminates cold and hot cycling conditions in cabin and increases heater life.
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5. Proven in field and produces experience.

To Select Your Heating Problems write today for the experienced counsel of South Wind's trained field engineers in adopting this or any other model in the complete South Wind line of heaters for commercial, military or civilian aircraft. Model ratings in capacity from 20,000 to 700,000 BTU/hr. South Wind Division, Sherman Warner Company, 1000, Indianapolis 1, Indiana.



Two 700,000 BTU/hr. packages
side by side in top of ship.

An inlet

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AIRCRAFT HEATING
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ANTI-ICING EQUIPMENT
INERT GAS GENERATORS



Heats to tail surfaces

Heats to cargo compartment

Heat to wings

Heat to forward cabin



Pin-Size Rectifiers For Heat and Cold

International Rectifier Co. has developed a new line of semiconductor silicon rectifiers (diodes) suitable for operation at temperatures of -60°C to +200°C. Typical dimensions are 1/8 in. dia. x 1/2 in. long.

The diodes are available for output voltages of 25, 40, 60, and 80 volts, at average output currents of 200 milliamperes and 1.5 amperes. The 1.5 amp diodes will operate under surge currents of 80 ma., the manufacturer says. The units are potted to protect them against both moisture and finger contact.

International Rectifier Co., 3521 East Grand Ave., El Segundo, Calif.

High-Reliability Tube Output Raised

General Electric has expanded production of its "high-reliability" vacuum tubes. GE says this use in radars systems equipment has reduced tube failure to 1/12 the failure experienced with standard tubes.

Originally developed by GE for Aero-Metrol Radar, Inc., as a three-year experimental project, the tubes are now available in 16 different types; their new types will be added by the end of the year, GE says.

GE's high reliability tubes, which they call their "Five Star" line, are currently available in the following types (standard prototype designation given): 6AK5, 1C11, 6AN5, 6AL5, 6Z11, 6BM6, 6BR4, 12AX7, 12AU7, 6AG5, 12AT7, 6C4W, 6AV6, 6BK7, 12XT7.

High 'Q' Coils

High 'Q' tuned coils wound with powdered iron or carbon-impregnated coils material are now available from D & K Ltd., an affiliate of G. M. Glavin & Co.

The coils are designed for use in electronic amplifiers or complete networks, including wave filters, equalizers, combiners and frequency discriminators. D & K Ltd., 302 E. Gettysburg St., Santa Barbara, Calif.

2701 Hermetically Sealed Solenoid Type No. 41701, AN4399-1

2702 Hermetically Sealed, Solenoid Type No. 9007, AN4213-1

3501 Sealed Air Connector Type No. 81748, AN4366-1

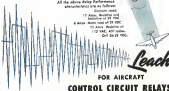
4101 Hermetically Sealed, Solenoid Type No. 90211

3504 Sealed Air Connector Type No. 9001, AN4366-1

2702 Hermetically Sealed Solenoid Type No. 9004, AN4213-1

4702 Sealed Air Connector Type No. 9007, AN4366-1

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Contact switch
17 Amp. Maximum and
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110 VAC, 60 Hz. only.
On 20-25 VDC.



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Valves

Test Pumps
Flexible Couplings

Coupler
Lamp Assembly

Woods and
Cabin Lamps

WHAT'S NEW

New Books

From the General Up, monthly edition, by Sandy A. P. Macdonald, 114 pages including index, illustrated. Published by Aviation Service Corp., Ltd., Fort Credit P.O., Ontario, Canada, price \$2.75.

Non-erect "how-to fly" books have been published, but this volume is a little better than most. Its language is that of the well-experienced and wise instructor carefully explaining the way of flight without being overbearing or talking down to his students. Sandy Macdonald certainly packs a wealth of knowledge. He's been flying since 1916 in a military, bush, charter and test pilot and has numerous types in his log.

Material in the book has been copied and to cover International Civil Aviation Organization standards. —EJB

Telling the Market

Those interested in flight instrument parts in this accelerated business, particularly of the World War I period, are catalog by Aukland, P.O. Box 418, New Rochelle, N. Y. They are non-assessable volumes, often result correct to collectors. Fuller lists small portable electronic systems designed to meet military specs. Write: Munson Electric Mfg. Co., Inc., 11214 W. Columbia St., Fresno 1, Calif.

How to Ship by Air is Catalogued. Better provides latest information on proper use of Air Express, airmail, air parcel post and combination service. It also covers postal regulations. Special loading chart allows quickly check for estimating weights and sizes for air cargo. There is a section on compressed packaging for fragile items. Write: Hyde & Dunck Paper Co., Souders, Ohio.

Adhesives, coatings and sealants used in aircraft production and maintenance are detailed in 14-page booklet available from Minnesota Mining & Mfg. Co.'s Adhesives and Coatings division, 4114 Republic Ave., Detroit. The Alcor Pyroter, non-combustible heat that automatically warms up to 200 degrees Fahrenheit protects a minute and gives instant readings on variations within any phase of heat processing, is described in folder available from Illinois Testing Laboratories, Inc., 435 N. LaSalle St., Chicago 10. Type CJTM also gives working methods for testing large diameter work such as jet turbine rotors as described in literature available from Linden Tool Co., Weymouth, Pa.

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It's fast—accurate—easy to operate. The South Bend 7" Precision Shaper can successfully give you low machining costs on small parts. Designed to handle a wide variety of work, it will enable you to obtain tight shapers for service jobs, set on machine in warehouse and convenient on both power and upturn. Find out how this versatile shaper can give you better service on production, toolroom or custom piece machining. Write for literature.

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RAM (table) — 3 to 27 inches per minute 10-15 to 300. Cutting speeds — 3 to 14 per minute. TOOTH FEED (table) — 1/32 to 1/16 inch. Feed and cut — .001" to .005".

TABLE (table) — 1 inch to 10". Vertical travel — 17". Power, max. load 30-100" to 100". Max. clearance — 1/2" to 1/16". Table size — 4' x 10' x 10'.

FOR Low weight — 47", low depth — 7", maximum weight — 47".

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The U.A.P. cold weather oil system system also starts in cold temperatures. It provides a reliable supply of heated oil to all engine parts, and most important of all, controls are ready for flight engine start. The U.A.P. system is suitable for all aircraft. Current production contracts can provide all the equipment, technical data and engineering assistance are available upon request.



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BAND



100-4000

Detailed description of standard bolt-securing winging systems is available on 16-page illustrated booklet, available by writing Development Laboratories, Profile Division, Bristol Aviation Corp., One & Lake Sts., Burbank, Calif.

Columbia, large, anti-lens flare booklet by Westinghouse Electric Corp., depicts firm's numerous activities, is well illustrated. Write the company at P.O. Box 1017, Pittsburgh, Pa.

Selection guide CEA 574 for wide range of electric and electronic controls, devices and accessories may be had from General Electric Co., Schenectady 5, N. Y.

Booklet DF 100 details the Bellon 4440 press book, including wiring diagrams and electronic bookkeeping systems with other packaged devices made by the firm. Write W. C. Richards, The Bellon Co., 212 W. Main St., Akron, Ohio. Catalog 10-A on sheet metal fabrication features hole punching, sanding and molding shows various accessories. Available from Wales Strapp Corp., 145 Penn. Ave., N. Tonawanda, N. Y.

New Addresses

Carlin's Fastener Corp. is moving its New York plant and office to a new facility at 22 Spring Valley Rd., Paramus, N. Y. Address has been 202 E. 46 St., New York. The new plant holds about 22,000 sq. ft.

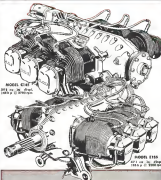
R. W. Seitz & Associates is a new advertising and sales promotion agency based primarily at serving the aircraft industry. Offices are at 1549 N. Highland Ave., Hollywood 28, Calif. Phone is CLadine 7985.

Publications Received

• The Principles of the Control and Stability of Aircraft, by W. J. Dornier, published by Cambridge University Press, 32 E. 57 St., New York 27, N. Y., 1951, \$5.00. A systematic study of numerous principles covers all the most important problems in the design and operation of aircraft.

• U. S. Fighting Planes 1912, by Lt. Col. Dale W. Cox, Jr., U. S. N., published by Aero Publishers Co., Inc., 444 Lexington Ave., New York 17, N. Y., 1951, \$1.98. Book contains illustrations and text.

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Continental Motors Corporation
Aircraft Engine Division
MUSKOGEE, MICHIGAN

EQUIPMENT

U.S. Buys French Portable Jet Starter

- Unit is being bought as standard for our forces.
- Purchase seen as test of off-shore procurement.

A portable, ground power unit developed by the French for starting jet aircraft engines is being purchased in quantity by the U. S. Air Force as the standard for our forces in Europe.

The unit met only chain jets, but certain engines as well, making it doubly useful for NATO forces. Its controls are simple, further enhancing its adaptability. It is an engine-driven unit, by the way, not an electric one.

► **Fast Start**—The jet power let, known as the "Asteroid," is being produced through the combined efforts of Aubrey et Sureau, and Sureau Eclairage, both of Nival, in France, and Ford SAF at Paris, France & Co.

It sports well of France's technical resources since the end of World War II, that this unit is produced by one industry personnel who had it earlier as standard in all armed, military, transportable equipment available in the U. S. Two more reasons for the preference: cost of the equipment is limited to \$10,000, and it is completely reliable.

► **On-Short Test**—In a case, the Asteroid represents an early test time in the portability of "out door" power unit of military application. In Europe, of course, there may point purchase of more goods with limited funds than would be possible in this country where many materials and labor are priced higher, the military situation.

It is the aim to strengthen European relations. But off-shore procurement can only be successful if goods received are up to the quality of those in the country and are delivered on schedule. Apparently, the Asteroid more than measures up to this requirement.

The equipment attracted notice of NATO air commanders last year at Rome AFB, showing Operation Ceres monitors when NATO forces must be based for joint operations. It was lighter than other equipment, requiring starting time of the F-4H Thunderbolt from 44 to 71 sec. (in later tests to 27 sec.) and exhibited favorably its capacity to be switched suddenly to a high turn jet to position plane starting.

For jet starting, the set introduces no imposed means of delivering power,



CONCRETE, PANEL for Asteroid, French jet power let, a mounted board cab of.



MOTOR TRUCK which gives stability. Fuel has not yet been mounted, in this photo.

as the engine of the diesel engine. By means of a pulsed electrical circuit, a large amount of constant level, let long voltage rise to meet many power demands of the jet engine as it takes up the engine.

The standard high-voltage pump creating an ether jet, provides greater starts and minimizes chances of over heating. Life of starting gas is lengthened and greater efficiency is used by reducing heat losses, Aubrey et Sureau explains.

Engineer most concerned and today keep village constant and permits current to use to meet power demand. But new controls are now being introduced by Bendix, which provide more control similar to that of the Asteroid.

► **Aubrey et Sureau**—The Asteroid consists basically of a special, self-contained electrical generator driven through a flexible coupling by a 22-hp. Ford gas engine. This group is assembled in a chassis to which is added the necessary controls, a fuel tank and batteries for operating the engine. A panel carries Ford engine controls at one end, jet starting controls on the other. The entire unit, weighing about 1,500 lb., can be adapted to various truck and trailer mounting arrangements so that it may be self-propelled or towed around the airfield.

The big generator is controlled by a conventional engine jet voltage regulator which in turn is controlled by three pilot regulators. ► **Regulator Action**—One of the pilot regulators is set to a low, starting up



... in 1937

... and in 1952

PLEXIGLAS for transparent enclosures

The canopy on the Grumman Cougar and the nose of the Stearman Explorer open like a book during which Plexiglas has been used for transparent enclosures on aircraft.

Through the years, PLEXIGLAS has remained aviation's standard transparent plastic because it provides the best balance of properties for aircraft glazing—clarity, light weight, formability, dimensional stability, and weather-resistance.

Robn & Huns acrylic plastic has kept pace with

advances in aircraft performance. Many of today's high speed, high altitude planes, for example, are glazed with Plexiglas H-100 (polyethylene glycol). This grade has improved resistance to heat, weather, and aging, and is long used by many Air Force and Navy contractors for transparent enclosures on aircraft powered aircraft.

For the planes of the future, Robn & Huns Laboratories are working to meet the quality of transparent plastics in even higher levels.



"One of the best" in new tests & from the world by the Air Force and the Navy in an official testing time to the maintenance of flight glazing, in new aircraft in the new military aircraft. It is a 100% acrylic, 100% acrylic plastic in color and weight. Acrylic plastic is one of the best plastics in the world in the Plastic Department. Robn & Huns, Chicago.

PLEXIGLAS is a trademark, but not the only acrylic plastic available in the Plastic Department.

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ing a heading which gave someone else of change would take the place to the DME system.

- Tread would be used by direct in based course reaching from pilot being able to meet exact final approach time.
- Fuel would be used both in direct and approach tracks. Checkpoints would parallel the course toward destination.
- Flight safety would be improved with less chances of mid-air collision. New aerial navigation in distance could be used in addition to conventional altitude and time methods.
- Savings in cost and weight of fuel alone would offset the cost and weight of DME.
- DME suit could replace the necessary of an emergency.

NEW AVIATION PRODUCTS



Missile Time Delay

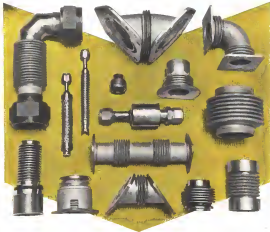
A group of time delay relays designed for special applications in guided missiles have been announced by MC 31 Rhodes, Inc.

The relays are air-gas driven, wound by solenoids and are furnished in various weathering, pole-thrust arrangements. In function they run too, some providing a sustained opening pulse, some a switch flutter, delayed time cycle, when providing sustained opening pulse, immediate switch closure, immediate time cycle, or sustained opening pulse, delayed switch closure, immediate time cycle.

Specifically, in the unit shown (Model 513 A), the timer is wound positively continuously (from 0.1 to 10 sec) as the control circuit is energized, and the switch opens very immediately. The time delay period begins when the control circuit is broken, but the switch remains closed until the expiration of the time cycle. At that moment the switch returns to its original position. The unit then is ready for recycling.

An important protective feature is that if the circuit is restored for some reason before expiration of the time delay period, the unit immediately re-winds and restores the total time delay period without disturbing the thrower over position of the switch.

Rhodes claims considerable experience



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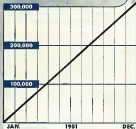
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MALFUNCTION**



PUMP HOURS PER MALFUNCTION



There can be no question of the reliability and testing qualities of Vickers equipment when it keeps up records like this. TWA maintenance records for 1951 indicate only one unscheduled removal of a Constellation cabin supercharger drive pump is a total of 304,578 pump hours.

These TWA Constellations make use of numerous Vickers Hydraulic units. Besides variable displacement pumps for mobile hydraulic system as well as cable supercharger drives, there are hydraulic motors, pressure reducing valves, relief valves, unloading valves, and accumulators.

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427

also in developing and producing precision aircraft components. Among its products have been superchargers for the Norden bomb sight, accelerometer for use in guided missiles and various fuel and bomb test rigs.

M. J. Rhodes Inc., Hartford Conn.



Jet Plane Tire

A new tire, for jet aircraft, that with stand repeated wheelbarrow loadings at 150 mph, under conditions where all others would fail after a few tests has been developed by B. F. Goodrich Co.

The two substance design principles under to these supercharged in a new turbine powerjet on two aircraft announced by the firm. The rapid quenching tests were conducted at Wright Air Development Center.

Even other tests specially designed for the tests had a double corner fire at six parallel loadings, Goodrich is later, while the tire was only five miles after 50 runs, it cleared. The highest performance is accomplished with sustained load wear, high load supporting capacity and good resistance to low temperatures, the company says. The photo above shows the tire being built at factory.

B. F. Goodrich Co., Akron, Ohio

Thin Diaphragms

Sensitive diaphragms of very thin metal for use in pressure transducers, pressure elements, units in automatic and other control applications, are now available from the Bristol Co.

The company has just recently opened new facilities for making and testing diaphragms of extremely thin stainless steel, Ni-Span C and phosphor bronze. Successful as welding of these components, the firm says, depends on the use of production equipment specially developed for the job.

The Bristol Co., Watbury 28 Conn.

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FINANCIAL

NWA Stockholders Use the Veto

But their turnout of Capital merger raises point that CAB may have to force 'desirable' unions.

The case of major airline mergers is covered in a recent article when Northwest Airlines stockholders rejected approval of the proposed consolidation of that company with Capital Airlines.

This unexpected but crucial in-

tervened arrival is a reminder of the many lessons concerning the consolidation of airline mergers or consolidations, even where broad areas of agreement exist and where negotiations are lacking.

► **Natural** & **Desirable**—The North-

west-Capital merger proposal represented one of the most "natural" ever advanced in the air transport industry. Civil Aeronautics Board is believed to have been favorably inclined toward this consolidation as being one of the "desirable" mergers it has long advocated.

The Board must find proposed mergers as being in the public interest before they can become effective. The law states the Board not to approve any arrangement which would result in creating a monopoly... or preclude another as owner but a party to the agreement. This threat of negating the amount of "another air carrier" represents a most troublesome hurdle for post and future mergers.

► **No Trade Objections**—It is therefore significant that despite the health of the Northwest-Capital combination, none of the current highly competitive in the area (United, Eastern, Atlantic and TWA) interpreted any objection to the merger, if consummated with all route segments of Capital and Northwest remaining intact. Surely here the Board has confronted with a merger proposal where the competitive factors involved have implied such a measure of success.

The essential elements of the benefits of mergers are inherent present in a Northwest-Capital combination.

► **The airline's air transport network** would be strengthened by the elimination of certain duplicated routes and the creation of a completely integrated fourth transcontinental line.

► **A more balanced route structure** could result, mutually enhancing revenue potentials and opportunities for increased operating economies.

► **A stronger financial condition** could thus evolve, placing the consolidated company in a fortified position to conduct domestic operations on a well-serviced economic base completely devoid of hard pay subsidies.

► **The public would benefit** by improved service and the availability of through subsidiaries to a vast of additional cities.

► **Employment** of both companies could benefit from improved security and a wider range of job opportunities.

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► **Employment** of both companies could benefit from improved security and a wider range of job opportunities.

► **Outside Effects**—The consummation of the vote of a small group of Northwest stockholders may well offset the progress of other pending merger mergers. Delta and Northwest filed a merger proposal more than two years ago. These two carriers sought to details routes 51 and 52 from Capital to provide their existing link from Atlanta to New York as a candidate to the Northwest-Capital merger. This was strongly resisted by Capital and this stand would hardly be shifted by recent developments. More recently, Delta and Chicago & Southern have announced a desire to merge, interesting Northwest in the pattern. In the meantime other affected carriers in-

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Titanium in DC-7

Titanium is about to get in the commercial transport field. Douglas Aircraft Co., Inc. has designed that sleek 180 ft. of weight will be used in the DC-7 by substitution of the metal for aluminum skin and floor and for structural steel in nacelles.

Approximately 85% of the skin on the DC-7 nacelles will be titanium. Two outboard nacelles will take the 105-gauge metal on an area of 11,500 sq. in. for a weight of 64 lb., as against a 68 lb. weight for 8,000 sq. in. of steel. In steel skin on outboard nacelles of the DC-68, inboard nacelles will utilize 11,500 sq. in. of the metal, weighing 64 lb., as against a steel nacelle weight of 7,600 sq. in. on the DC-68. DC-7 landing gear doors will use 2,000 sq. in. of titanium compared with 1,700 sq. in. of steel on the DC-68.

Fuselage changes will give a substantial weight reduction. Here, titanium substitution for steel gives savings of 11,500 sq. in. will save off about 44 lb.

95,000 lb., the maximum landing gross weight.

Passenger maximum rate of climb at sea level rises from 1,810 ft. per min. at gross load of 95,000 lb. to 1,915 ft. at 122,200 lb., or 20,000 lb. above, the rate of climb rises from 1,930 to 2,030, respectively.

Altitudes at which three-engine rate of climb equals 1,810 ft. per min. at gross weight 95,000 lb., 12,780 ft. at 105,000, and 17,880 ft. at 122,200 lb. Level flight speed at maximum take-off weight is 410 mph at 95,000 lb. and climbs 22,000 ft.

Operator's weight savings for this plane is 69.6 lb. for domestic operation and 71,035 lb. for over-ocean operation. Manufacturer's empty weights are 46,175 lb. and 56,835 lb., respectively.

ACC to Review Airport Proposals

President Truman has asked the Air Coordinating Committee to analyze how to meet the requirements of the President's Air Commission report, submitted under the chairmanship of Gen. James H. Doolittle (Aviation Week May 26, p. 14).

The President in his letter to the ACC from the report "a most important document." He says "it sets

the pattern for future airport development, taking into consideration the welfare of people who live near airports, and the continuing well-being of our country as a nation, both military and commercial."

The President added that "the recommendations of the commission appear to be sound, and I am anxious that a prompt analysis of the report be made, in order that implementation may be undertaken."

Chief recommendations of the report:

- Flight simulator training for airline pilots.
- Single runway airports.
- Cleared runway extensions.
- Federal licensing of airports.
- Zoning restrictions beyond runway end.
- More federal aid to airports.
- Preferential revenue use.
- Income tax-wind component and deferred allowable to avoid use of preferential money selection to evade income taxes and savings over long-polluted areas.

Merger Cancellation Disappoints Capital

Northwest Airlines as a letter to stockholders has announced withdrawal of its CAB application to merge with Capital Airlines. The two companies, Capital, which the two lines should have made another stab at getting Northwest stockholder approval—based upon the first vote by a 10-to-9 margin—lost out of heart of new NWA holder, Wilbur Shuford.

Northwest View—Shuford, a letter Northwest President Carl Hunter sent his stockholders.

"At the annual meeting, May 29, the proposed merger of Northwest Airlines with Capital Airlines failed to receive the necessary affirmative vote of two-thirds of the total outstanding stock. Out of a total of 1,205,701 shares, 583,862 affirmative votes were required. The vote was 716,835 in favor of the plan and 167,995 opposed. Accordingly, we will reject the CAB Application Board to withdraw the application for approval of a merger and the proposed agreement of merger will be terminated."

Capital View—On losing this news, Capital President J. H. Cornshead wrote his stockholders:

"Two large blocks of stock voted against the merger, thereby defeating the proposal. Because of the strong opposition in favor of the merger, it is evident to the public and official acceptance of the proposal and the 10 to 9 vote of the Northwest stockholders it appeared likely that Northwest in addition to its agree-

ment would take action to further the merger proposal."

We advised Northwest of our willingness and desire to continue the merger agreement in force, pending further possible recommendations by their stockholders. Today, however, we have been advised by Northwest Airlines that it has taken the necessary steps to withdraw the application before the CAB for approval of the merger and to thereby terminate the proposed agreement of merger. We regret the action, as we feel the merger would have benefited the stockholders of both companies and would have been much to the public interest."

Piedmont Granted Certificate Renewal

Civil Aeronautics Board has renewed the certificate of Piedmont Airlines, a local airline serving Virginia, West Virginia, Ohio, Kentucky, Tennessee, North Carolina and South Carolina.

But the Board took it as policy of keeping the local lines in business. However, certificates only Piedmont's certificate is good to the end of 1957. That makes it a seven-year certificate renewal, technically, because the old one expired Dec. 12, 1955. But since the renewal was issued only this month, it is actually just a five-year term.

The local airlines with longer terms, or permanent certificates like the trunk line, this would surely approve their cable standing. But the Board feels that in one of a change of one government attitude on continued heavy airline subsidies was due, permanent certificates might catch CAB with an implied permanent obligation to subsidize the local, but with no money to do it.

The Board has given Piedmont a new route from Richmond, Va., to Knoxville, Tenn., and some small route extensions in Kentucky and North Carolina. The Board transferred Hickory, N. C. to Piedmont; local Capital Airlines, suspended American Airlines from Lexington and Roanoke, Va., and eliminated Piedmont service from Portsmouth, N. C. and Princeton, N. J.

"Fish Special" Airline

(McGraw-Hill World News)

Johnsburg-Lakeview Airlines is start operation in Central African Territories as a fish special, a single lightplane flying between a fishing village and the Port of Mombasa, East Coast and Salisbury in Southern Rhodesia. Rhodesians formerly were supplied fish from South African ports by refrigerated trucks, the top taking 10-14 days. The plane flies the route in 6 hr.

Mackey Certified For Nassau Service

The President has approved a Civil Aeronautics Board grant of a certificate to Mackey Air Transport of Fort Lauderdale, Fla. The Board originally denied Mackey's application, but soon issued it.

Mackey is certified for three years to fly passengers and cargo from West Palm Beach, Fla. to London to Nassau, British West Indies.

Mackey's main business on this route comes from winter holiday tourists to Nassau. The Board and the

prudent service by U.S. citizens on this route is inadequate for tourist travel of one day's duration.

Eastern, American List Top Salaries

Two major trunk airlines have reported salaries, bonuses and stock holdings of their executives and directors during 1951, as shown in the following list. Comparable figures for 1950 are in parentheses.

* American Airlines, Inc.—C. R. Todd, president, \$100,000 salary, \$10,000 bonus, 100,000 shares; J. R. Martin,

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100	40000-3	Carburetor
100	40000-4	Carburetor
100	40000-5	Carburetor
100	40000-6	Carburetor
100	40000-7	Carburetor
100	40000-8	Carburetor
100	40000-9	Carburetor
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100	40000-58	Carburetor
100	40000-59	Carburetor
100	40000-60	Carburetor
100	40000-61	Carburetor
100	40000-62	Carburetor
100	40000-63	Carburetor
100	40000-64	Carburetor
100	40000-65	Carburetor
100	40000-66	Carburetor
100	40000-67	Carburetor
100	40000-68	Carburetor
100	40000-69	Carburetor
100	40000-70	Carburetor
100	40000-71	Carburetor
100	40000-72	Carburetor
100	40000-73	Carburetor
100	40000-74	Carburetor
100	40000-75	Carburetor
100	40000-76	Carburetor
100	40000-77	Carburetor
100	40000-78	Carburetor
100	40000-79	Carburetor
100	40000-80	Carburetor
100	40000-81	Carburetor
100	40000-82	Carburetor
100	40000-83	Carburetor
100	40000-84	Carburetor
100	40000-85	Carburetor
100	40000-86	Carburetor
100	40000-87	Carburetor
100	40000-88	Carburetor
100	40000-89	Carburetor
100	40000-90	Carburetor
100	40000-91	Carburetor
100	40000-92	Carburetor
100	40000-93	Carburetor
100	40000-94	Carburetor
100	40000-95	Carburetor
100	40000-96	Carburetor
100	40000-97	Carburetor
100	40000-98	Carburetor
100	40000-99	Carburetor
100	40000-100	Carburetor

SPECIAL GROUP!

Quantity	Part No.	Description
100	40000-101	Carburetor
100	40000-102	Carburetor
100	40000-103	Carburetor
100	40000-104	Carburetor
100	40000-105	Carburetor
100	40000-106	Carburetor
100	40000-107	Carburetor
100	40000-108	Carburetor
100	40000-109	Carburetor
100	40000-110	Carburetor
100	40000-111	Carburetor
100	40000-112	Carburetor
100	40000-113	Carburetor
100	40000-114	Carburetor
100	40000-115	Carburetor
100	40000-116	Carburetor
100	40000-117	Carburetor
100	40000-118	Carburetor
100	40000-119	Carburetor
100	40000-120	Carburetor
100	40000-121	Carburetor
100	40000-122	Carburetor
100	40000-123	Carburetor
100	40000-124	Carburetor
100	40000-125	Carburetor
100	40000-126	Carburetor
100	40000-127	Carburetor
100	40000-128	Carburetor
100	40000-129	Carburetor
100	40000-130	Carburetor
100	40000-131	Carburetor
100	40000-132	Carburetor
100	40000-133	Carburetor
100	40000-134	Carburetor
100	40000-135	Carburetor
100	40000-136	Carburetor
100	40000-137	Carburetor
100	40000-138	Carburetor
100	40000-139	Carburetor
100	40000-140	Carburetor
100	40000-141	Carburetor
100	40000-142	Carburetor
100	40000-143	Carburetor
100	40000-144	Carburetor
100	40000-145	Carburetor
100	40000-146	Carburetor
100	40000-147	Carburetor
100	40000-148	Carburetor
100	40000-149	Carburetor
100	40000-150	Carburetor

PRATT AND WHITNEY

AIRCRAFT ENGINE PARTS

Quantity	Part No.	Description
100	40000-151	Carburetor
100	40000-152	Carburetor
100	40000-153	Carburetor
100	40000-154	Carburetor
100	40000-155	Carburetor
100	40000-156	Carburetor
100	40000-157	Carburetor
100	40000-158	Carburetor
100	40000-159	Carburetor
100	40000-160	Carburetor
100	40000-161	Carburetor
100	40000-162	Carburetor
100	40000-163	Carburetor
100	40000-164	Carburetor
100	40000-165	Carburetor
100	40000-166	Carburetor
100	40000-167	Carburetor
100	40000-168	Carburetor
100	40000-169	Carburetor
100	40000-170	Carburetor
100	40000-171	Carburetor
100	40000-172	Carburetor
100	40000-173	Carburetor
100	40000-174	Carburetor
100	40000-175	Carburetor
100	40000-176	Carburetor
100	40000-177	Carburetor
100	40000-178	Carburetor
100	40000-179	Carburetor
100	40000-180	Carburetor
100	40000-181	Carburetor
100	40000-182	Carburetor
100	40000-183	Carburetor
100	40000-184	Carburetor
100	40000-185	Carburetor
100	40000-186	Carburetor
100	40000-187	Carburetor
100	40000-188	Carburetor
100	40000-189	Carburetor
100	40000-190	Carburetor
100	40000-191	Carburetor
100	40000-192	Carburetor
100	40000-193	Carburetor
100	40000-194	Carburetor
100	40000-195	Carburetor
100	40000-196	Carburetor
100	40000-197	Carburetor
100	40000-198	Carburetor
100	40000-199	Carburetor
100	40000-200	Carburetor

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EDITORIAL

Air Power's Best Friend

It is good because it means air power still commands strong public interest, and these three public figures make it so.

There may have been a temporary decline in an owner's stock in the backrooms of the Tribune last week, and among certain Capitol Hill "crossers" circles.

But the quick and eager denial from the men who have been accused of manufacturing the Air Force's deteriorated results that the drop in nation's stock doesn't have public approval, and so must be temporary.

As power wends such publicity now. It has been taking a draining, head-doubling toll on politicians and wily wady elements of the military high command. The people are confused but they still believe in an all-powerful They want us to have an adequate air force—wherever that may be. They don't know what we have now. It is impossible to read all of the conflicting public state means being made these days and try to make any sense of them.

As power needs leaders and open public discussion of the facts. And we must face facts. We have had too much censorship, too much post-hoc glibble-glibble from the Joint Chiefs of Staff and top Air Force officials. Those spokesmen in high places seem to have considered it more important to save their own skins by hiding the facts of the Truman lodge-rousting, and by trying to gild the Administration's belittling denials of political expediency than to uphold their own sworn pledges to protect the United States from present or potential enemies.

Their betrayal of his power should go down in history, for what it is—the betrayal of the nation.

This sounds like mere reiteration, but evidence based on facts serves a constructive purpose when it helps correct past mistakes. It is a healthy thing to set the record straight and cut through the misleading outbursts and impressions. Someone should challenge the current moorings of Mr. Tennes about his devotion to an error.

It was that Timmer who ended in politically an aviator's public popularity in 1947 by appointing a distinguished group of men to his President's Air Policy Commission. These men were to listen to the best minds in the country, deliberate, and come up with a long-term plan that would do most to assure the nation's security and aviation's healthy future. It wound up by recommending a 39-group Air Force, among many other innovations, both military and civil.

Mr. Truman is only 1945 backed up the request for

a 70-group Air Force and signal-hunting Naval Air. As a pointed out in today's Washington Roundup page, Congress created funds for 70 groups in early 1948.

But in early 1949, let the record show that Mr. Truman reversed himself and plunged for a 48-group Air Force. Further, at the same precipitous moment in which he got us into a war in Korea—he arbitrarily and without consulting his own Air Force in its infancy, even after both Houses of the people's Congress had voted it by overwhelming margins of 100 to 10 in the Senate.

Mr. Truman—the accused friend of an power-killed the 70 group. As Faced by forcing the people's will. He impeded the appropriation for the sale means that he had not consented it.

Partly because of what Mr. Trosna thought of as power in 1949, we must concede Rad an superiority in 1950 today.

Let us remember this well throughout the political year 1912.

Aviation's Built-in Headwinds • •

Our contemporary, Fred Cunha, of the New York Times, finds that the airlines "are more than a little surprised by the response of the air-traveling public" to trans-Atlantic air travel bans.

Everybody, we'd guess, except Pan American Airways. They said it would be like this when they virtually strangled the reluctant dragons of the industry into oblivion: ocean coach or getting lost in the shuffle.

For American's Atlantic division vice president, Harold Hanna, cables from Vietnam that in April and May, the year prior Atlantic passengers of all airlines averaged 4,800 a week, of whom 2,800 were first class. In the same period of 1991, the total was 2,400 passengers a week, so that even with an tourist boom that year, first class traffic is still up.

There is no substitute for giving the people a good product at the lowest possible price. It applies to one item as to any other business. Why the response? One of the troubles with unions is our built-in leadership—our own union, short-sighted executives who tell unions

- - And Those Subsidy Economists

The U.S. airline industry is committed for about \$777 million in new flight equipment, for delivery between now and 1994, and another \$150 million may be required with advent of turbine engines, says Aaron Orr, *Airbus*' vice president and treasurer, William J. Hanna, is a member.

That, the industry's requirements in the next few years may approach 1 billion dollars.

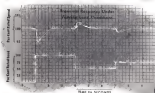
With all of these thousands of additional acids to fill, some industry "economists" are promoting the propaganda that the only way to sell them is to raise prices.

Care, Gentlemen—just how do you land more sales and entice thousands of new customers by naming prices?

-Robert H. Wood

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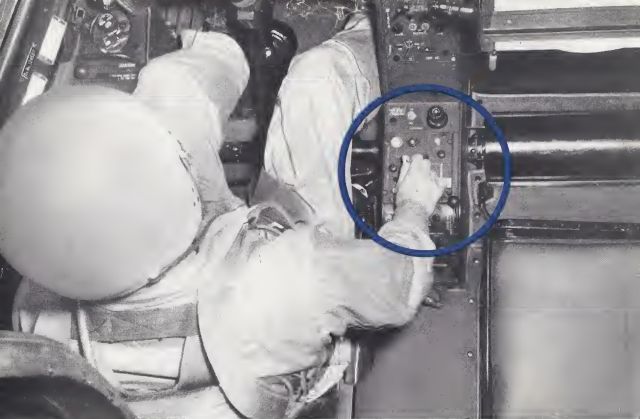
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New G-3 autopilot fits snugly in Douglas F3D-2 fighter cockpit. Device handles all autopilot duties, has additional automatic and control features.

New All-Electric Autopilot for Navy Jets

New G-E Autopilot Now in Operational Use in Marine Night-Fighter Squadrons; Other Installations Scheduled

A new autopilot, the General Electric G-3, is now in operational use in Douglas F3D-2 Skyknights and is being installed in Grumman F9F-5P Panthers. It is scheduled for Grumman's new swept-wing F9F-6P, Douglas's A2D Skyshark and other hot Navy planes.

In addition to the main requirements of high speed flight—such as suppressing or eliminating "dutch roll" and high-frequency oscillation—the G-3 incorporates additional control features. It includes continuous automatic synchronization, automatic altitude control, "level-out" and "maneuver-holding" provisions, and allows for wide-angle attitude of autopilot engagement.

All-electric, the G-3 was developed and produced by General Electric in close cooperation with the Navy's Bureau of Aeronautics. It is now in mass production in G-E plants.

The G-3 autopilot is another in the long line of G-E products engineered for the aviation industry by men who know the needs of the air. Whether your needs are for a single generator or a complete bomber defense system—or anything in between—it's a good idea to call your General Electric aviation specialist. *General Electric Company, Schenectady 5, New York.*

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